Office of Motor Carriers
Federal Highway Administration
U.S. Department of Transportation

prepared by
The Center for National Truck Statistics
University of Michigan Transportation Research Institute

Truck and Bus
Accident Factbook 1992

UMTRI-94-44

Truck and Bus Accident Factbook, 1992

December 1994

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The Center for National Truck Statistics
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for
The Office of Motor Carriers
Federal Highway Administration

The opinions, findings, and conclusions expressed in this publication are those of the Center for National Truck Statistics and not necessarily those of the Michigan Office of Highway Safety Planning or the U.S. Department of Transportation, Federal Highway Administration. This report was prepared in cooperation with the Michigan Office of Highway Safety Planning and U.S. Department of Transportation, Federal Highway Administration.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTRI-94-44		

4. Title and Subtitle	5. Report Date
Truck and Bus Accident Factbook 1992	December 1994
	6. Performing Organization Code: UMTRI-94-44
7. Author(s): Center for National Truck Statistics	8. Performing Organization Report No.
9. Performing Organization Name and Address: The University of Michigan, Transportation Research Institute, 2901 Baxter Road, Ann Arbor, Michigan 48109-2150	10. Work Unit No.
	11. Contract or Grant No.: PA-94-09
12. Sponsoring Agency Name and Address: Office of Highway Safety Planning, Department of State Police, Lansing, Michigan 48913	13. Type of Report and Period Covered: Special Report, 1992
	14. Sponsoring Agency Code

15. Supplementary Notes

Funds provided by : Office of Motor Carriers
Federal Highway Administration
Washington DC 20590

16. Abstract

This document presents aggregate statistics on trucks and buses involved in traffic accidents in 1992. These statistics are derived from four sources: accident statistics reported through the SAFETYNET data system operated by the Federal Highway Administration's Office of Motor Carriers; the General Estimates System file maintained by the National Traffic Safety Administration (NHTSA); the Fatal Accident Reporting System, also maintained by NHTSA; and the Trucks Involved Fatal Accidents file compiled by the University of Michigan Transportation Research Institute. All accidents reported on herein meet the SAFETYNET severity threshold of either a fatality, an injury transported from the scene for medical attention, or at least one vehicle towed from the scene as a result of disabling damage sustained in the accident.

An estimated 139,000 trucks and 15,000 buses were involved in traffic accidents in 1992. There were 4,767 fatalities and 109,000 non-fatal injuries in accidents involving trucks. 315 persons were killed in bus accidents and 25,000 were injured. 521 truck drivers received fatal injuries as a result of traffic accidents.

17. Key Words	18. Distribution Statement
Medium trucks, heavy trucks, buses, accident statistics, SAFETYNET	Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
None	None	96	

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
	AREA			
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yards	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
	VOLUME			
fl oz	fluid ounces	29.57	milliliters	ml
gal	gallons	3.785	liters	l
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: Volumes greater than 1000 l shall be shown in m^3.				
	MASS			
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5(F-32)/9 or (F-32)/1.8	Celcius temperature	°C
	ILLUMINATION			
fc	foot-candles	10.76	lux	l
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
	FORCE and PRESSURE or STRESS			
lbf	poundforce	4.45	newtons	N
psi	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
	AREA			
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	ac
ha	hectares	2.47	acres	mi^2
km^2	square kilometers	0.386	square miles	
	VOLUME			
ml	milliliters	0.034	fluid ounces	fl oz
l	liters	0.264	gallons	gal
m^3	cubic meters	35.71	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
	MASS			
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg	megagrams	1.103	short tons (2000 lb)	T
	TEMPERATURE (exact)			
°C	Celcius temperature	1.8C + 32	Fahrenheit temperature	°F
	ILLUMINATION			
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
	FORCE and PRESSURE or STRESS			
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	psi

* SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.

(Revised August 1992)

Summary Truck and Bus Accident Statistics

Accidents:

- 139,000 trucks were involved in traffic accidents in 1992
- 4,185 trucks were involved in fatal accidents; 57,000 trucks were involved in an accident with a non-fatal injury; and 78,000 trucks were involved in an accident in which no one was injured but at least one vehicle was towed
- There were 4,767 fatalities and 109,000 non-fatal injuries in accidents involving a truck

Truck drivers:

- 521 truck drivers died in traffic accidents; of those, 359 (69%) died in single-vehicle accidents
- 1.3% of truck drivers involved in all accidents had been using alcohol, compared with 5.6% of accident-involved passenger car drivers

Truck configuration:

- About 48% of the trucks involved in all traffic accidents were single-unit (no trailers) and 51% pulled at least one trailer; truck configuration could not be determined in 1% of the cases
- 30% of trucks involved in fatal accidents were single-unit and about 68% pulled at least one trailer
- There were 46 "longer combination vehicles" (LCVs) involved in fatal accidents, including 3 triples

Buses:

- 15,000 buses were involved in traffic accidents in 1992
- 284 buses were involved in fatal accidents
- 315 people were killed in bus accidents and 25,000 were injured

Hazardous materials:

- There were 202 trucks carrying hazardous materials involved in fatal accidents in 1992
- There were spills of hazardous materials from 30 of the 4,185 trucks involved in fatal accidents in 1992 (less than 1%)

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Truck Accidents

Vehicles: Trucks

Drivers: Trucks

Special Focus: Longer Combination Vehicles

Bus Accidents

I. Introduction

This document presents aggregate statistics on trucks and buses involved in traffic accidents that occurred in the United States in 1992. These statistics are derived from four sources: accident statistics reported through the SAFETYNET data system operated by the Federal Highway Administration's Office of Motor Carriers (OMC); the General Estimates System (GES) file maintained by the National Highway Traffic Safety Administration (NHTSA); the Fatal Accident Reporting System (FARS) file, also maintained by NHTSA; and the Trucks Involved in Fatal Accidents (TIFA) file compiled by the University of Michigan Transportation Research Institute.

The present *Truck and Bus Accident Factbook* replaces the OMC's former annual reports, *Accidents Reported by Motor Carriers of Property* and *Accidents Reported by Motor Carriers of Passengers.* Those reports were based on material provided by motor carriers who were required to submit reports on traffic accidents meeting certain criteria. The information was submitted only by commercial carriers who operated in interstate commerce.

The *Truck and Bus Accident Factbook* is intended to be a comprehensive overview of truck and bus accidents in the United States. All truck and bus involvements meeting a uniform severity threshold are included, regardless of whether the carriers operate in interstate commerce. Data reported here are collected from police accident reports and telephone interviews with involved parties. The data sources are described in more detail below.

What this factbook covers

In this report, an **accident** is a traffic accident meeting the SAFETYNET reporting criteria. SAFETYNET reporting criteria consist of two parts: one defining the types of vehicles involved in the crash, the other defining a reportable accident.

1. Vehicles

- Truck—a motor vehicle equipped for carrying property and having at least two axles and six tires or a vehicle displaying a hazardous materials placard

- Bus—a vehicle designed to carry at least sixteen people including the driver

2. Accidents

A reportable accident involves one or more trucks or buses and results in at least one of the following:

- A fatality (one or more persons killed as a result of the accident)

- An injury (one or more persons transported from the scene for immediate medical attention to injuries resulting from the accident)

- A towaway (one or more vehicles towed from the accident as a result of disabling damage sustained in the accident)

All accident statistics in this report conform to these criteria.

The use of multiple data sources

This factbook is based on multiple sources of data. Each source brings strengths that complement the others. The GES file provides national estimates for accidents of all severities and an extensive list of variables describing the accident and the vehicles involved. However, GES is a sample file and estimates from small subsets of the data, such as fatal involvements, have relatively large sampling errors associated with them. The TIFA file is limited to fatal truck accidents only, but it is a census file, with data on each fatal accident in which a truck was involved. The FARS file is a census file of fatal accidents and, unlike TIFA, includes fatal bus accidents. The SAFETYNET accident file will also be a census file, with one record for each truck and bus in a reportable accident, though it will only have a limited number of variables describing the accident and vehicle.

The SAFETYNET accident system was not fully implemented for the 1992 calendar year. States are not required to report truck and bus accidents through SAFETYNET until January 1, 1994. Not all States reported 1992 data to SAFETYNET. For the 1992 calendar year, only about half the States reported any data and, in many cases, the data appear to be incomplete. Consequently, this factbook will be based primarily on data from the GES and TIFA files, with some data from the FARS file. Factbooks in future years will incorporate data from SAFETYNET.

Data sources

SAFETYNET: SAFETYNET is a data management system administered by the Federal Highway Administration (FHWA) in support of Federal and State motor carrier safety programs. Taken as a whole, SAFETYNET is an automated system to collect carrier, driver, and vehicle inspection data as well as accident information. The accident information in SAFETYNET incorporates a uniform set of data elements and definitions for truck and bus accidents meeting a uniform threshold. These data are coded from standard State police accident reports or from supplemental data forms developed to comply with SAFETYNET reporting requirements. The data are electronically submitted through the SAFETYNET system and combined into an analysis file. Data elements provide driver and carrier information, vehicle configuration and cargo body style, accident time and location, the number of fatalities and injuries transported for treatment, and whether any vehicles were towed. When all States are fully reporting, SAFETYNET will provide a census of all truck and bus accidents meeting the reporting criteria.

GENERAL ESTIMATES SYSTEM: GES is compiled by the National Center for Statistics and Analysis (NCSA) within the National Highway Traffic Safety Administration (NHTSA). The file incorporates data from a probability-based, nationally-representative sample of police-reported accidents. It covers all motor-vehicle types, including medium and heavy trucks. All police-reportable accidents are included. Approximately 48,000 accidents are sampled each year. The police accident report (PAR) is the sole source of data. Frequencies based on the GES file reported in the tables in this report are national estimates, calculated using an appropriate weighting variable. Since GES is a sample file, estimates are subject to sampling error. The Technical Appendix herein includes information on confidence intervals for population estimates made from GES data.

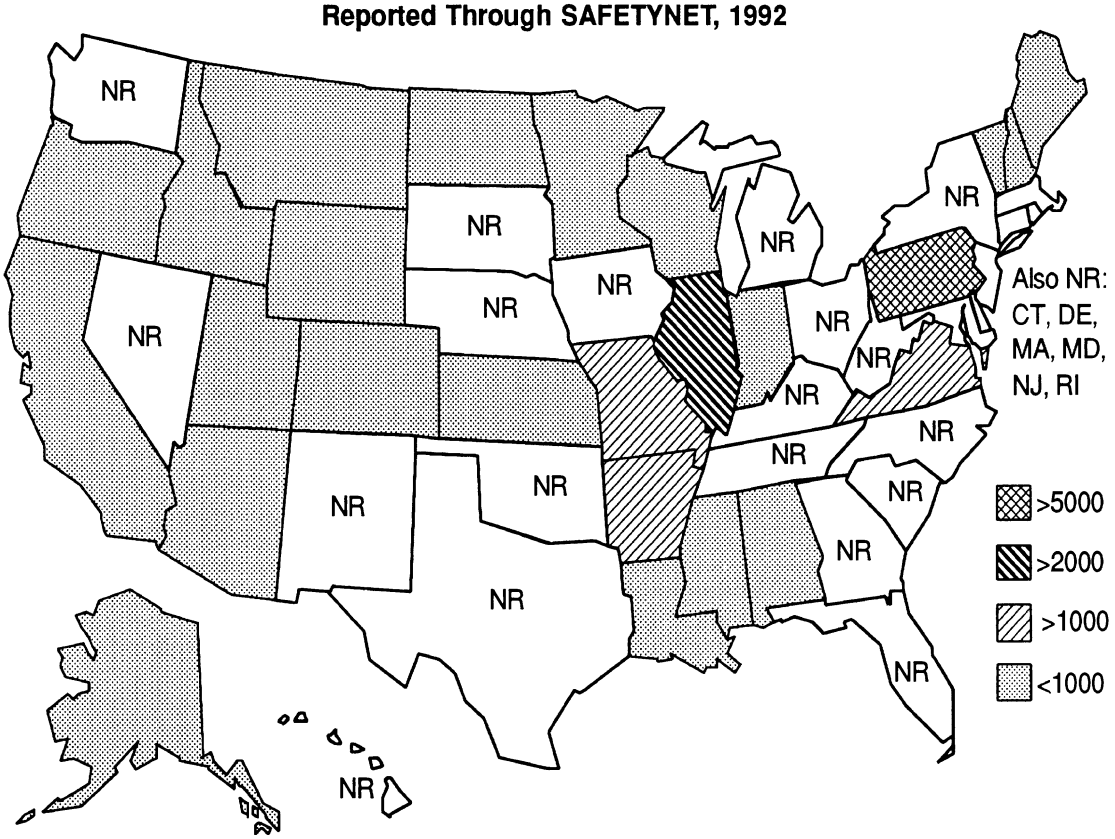
FATAL ACCIDENT REPORTING SYSTEM: FARS is compiled by the NCSA within NHTSA. The file contains data on a census of fatal traffic accidents within the 50 States, the District of Columbia, and Puerto Rico. FARS includes records for all accidents involving a motor vehicle on a trafficway which resulted in the death of a vehicle occupant or nonmotorist within 30 days of the accident. Trained employees within each State code over 100 data elements from a variety of State documentary sources. These data are then transmitted to a central computerized database and compiled into the FARS file by NHTSA.

TRUCKS INVOLVED IN FATAL ACCIDENTS: The University of Michigan Transportation Research Institute (UMTRI) produces the TIFA file. TIFA contains detailed information on all medium and heavy trucks involved in fatal accidents in the United States, excluding Alaska and Hawaii. The file combines information from the Fatal Accident Reporting System (FARS), police accident reports, and comprehensive telephone interviews conducted by UMTRI research staff. TIFA includes most FARS variables, supplemented with a detailed description of each involved truck collected by the TIFA interview process. For 1992, data from the Motor Carrier Safety (MCS) 50-T form submitted to the Office of Motor Carriers was also used. If an MCS 50-T form was matched to a FARS case, pertinent data were transcribed onto the TIFA interview form. All other information was collected by telephone interviews with involved parties, most often the driver or operator of the truck. All interview and MCS 50-T data are carefully reviewed by editors.

Current status of SAFETYNET

All States participating in the Motor Carrier Safety Assistance Program (MCSAP) are required to report qualifying truck and bus accidents through the SAFETYNET accident system beginning January 1, 1994. Even though reporting was not mandated prior to 1994, many States had developed data collection and reporting procedures and begun submitting cases before that year. Twenty-five States (figure I-1) reported at least some accident data for 1992, two years before the mandatory start date. These States reported a total of 20,064 cases. Some of the reporting States did not supply complete data for all records, and other States reported only a handful of cases. However, several States reported a substantial number of cases, as the figure indicates. Such cooperation two years in advance of the full implementation of the program is a very promising start for the SAFETYNET accident system.

Figure I-1 Truck and Bus Accident Records Reported Through SAFETYNET, 1992



Reporting by the States through SAFETYNET is intended to replace reporting by carriers to the Office of Motor Carriers using the MCS 50-T (truck) and MCS 50-B (bus) forms. Preliminary indications are that the SAFETYNET accident data will be a significant improvement. The OMC 50-T and 50-B data were subject to criticism because they were provided by the carriers themselves, and only carriers who operated interstate were required to report. Thus, not all qualifying traffic accidents were, in fact, reported. In contrast, all truck or bus accidents that meet the common threshold are reportable to SAFETYNET. Shifting responsibility to the States from the carriers should improve the census of truck and bus accidents. Two years before compliance was required there were significant levels of reporting. In some States, reporting through SAFETYNET for 1992

surpassed the number of cases filed with the OMC on MCS 50-T and MCS 50-B forms. Of the twenty-five States that transmitted 1992 cases to SAFETYNET, fourteen included more truck accidents than were reported to the OMC in that year through carrier self-reporting. Eight States reported more fatal truck accidents than were reported to the OMC.

Though sufficient SAFETYNET data were not available for this edition, when the SAFETYNET accident system is fully implemented SAFETYNET data will be incorporated in future editions of the *Truck and Bus Accident Factbook*.

Note on the towaway criterion and GES

The GES file includes data for every vehicle in a sampled accident whether it was towed due to damage or towed for some other reason. A review of the variable showed that most of the cases coded as "towed not due to damage" should have been coded "towed due to damage." The GES data are coded entirely from police reports and few, if any, indicate the reason for towing. Police reports in many States simply permit the reporting officer to indicate whether the vehicle was towed and the location to which it was removed. Since the "towed not due to damage" code does not appear to be reliable, all truck or bus cases where at least one vehicle was towed, whether coded as due to damage or not, are included in the estimates derived from GES. This may result in an overestimation of towaway cases, but the amount of overestimation is probably small.

Note on data rounding and missing data

The GES file is a sample file, with associated sampling errors. The Technical Appendix discusses the GES sampling procedure and includes a table of sampling errors for different size estimates. Estimates from the GES file in this report are rounded to the nearest thousand. Percentages shown were calculated before the rounding was done. All figures for fatal accidents or fatalities in accidents are taken from the TIFA file or in some instances from the FARS file. Both TIFA and FARS are census files. Figures from TIFA or FARS are regarded as true population totals and are not rounded.

Cases with missing data in the TIFA or FARS files are reported in the tables. The GES file includes variables for which missing data have been removed through complex statistical procedures. These "imputed" variables are used in this report. A description of the statistical procedures for imputing data in the GES file is provided by *Imputation in the General Estimates System* (DOT HS 807 985).

II. Trends and Overview: Trucks

In 1992, almost six million trucks were registered to operate on U.S. roads (table II-1). Together, these trucks traveled an estimated 153 billion miles, averaging over 26,000 miles per truck. Combination trucks, primarily tractors pulling a single semitrailer, averaged almost 60,000 miles per year, while single-unit trucks, primarily straight trucks, averaged 12,400 miles. There were 133,000 accidents involving at least one truck, with a total of 139,000 trucks involved. Almost 4,200 trucks were involved in accidents in which at least one person was killed (**fatal** accident). An additional 57,000 trucks were involved in accidents in which at least one person was injured severely enough to be transported for medical attention, though no one was killed (**injury** accident). Finally, an estimated 78,000 trucks were involved in accidents with no fatalities or injuries transported for treatment, but with at least one vehicle damaged severely enough to be towed (**towaway** accident).

Table II-1 Truck Statistics, 1992

	Single-Unit	Combination	Unknown	Total
Vehicles				
Registrations	4,316,148	1,654,777	0	5,970,925
Miles traveled (millions)	53,506	99,032	0	152,538
Average travel	12,397	59,846	0	25,547
Accidents				
Number	64,000	68,000	1,000	133,000
Number of trucks involved	67,000	71,000	2,000	139,000
Vehicles by accident severity				
Fatal	1,257	2,849	79	4,185
Injury	29,000	28,000	1,000	57,000
Towaway	37,000	40,000	1,000	78,000
Total	67,000	71,000	2,000	139,000
Involvement rate per million VMT				
Fatal	0.023	0.029	n/a	0.027
Injury	0.542	0.283	n/a	0.374
Towaway	0.692	0.404	n/a	0.511
Total	1.252	0.717	n/a	0.911

Sources: *Highway Statistics 1992*;
1992 TIFA; 1992 GES

Five-year trends of vehicles and injuries

The number of trucks involved in fatal accidents has declined from the previous year in each of the last four years (table II-2). In 1988, almost 5,500 trucks were involved in an accident in which at least one fatality occurred. By 1992, that number had declined to 4,185.

Some apparent year-to-year changes reported in the tables for injury and towaway involvements may not be statistically significant. Estimates of injury and towaway involvements are made using GES files. Since GES files are the product of sampling, each estimate has an associated sampling error. Tests of significance have been calculated for the differences between the yearly totals, and where those differences are statistically significant, they will be identified in the text. The number of fatal involvements is taken from the TIFA file. Because TIFA is a census file, the number of fatal involvements and fatalities is known with confidence.

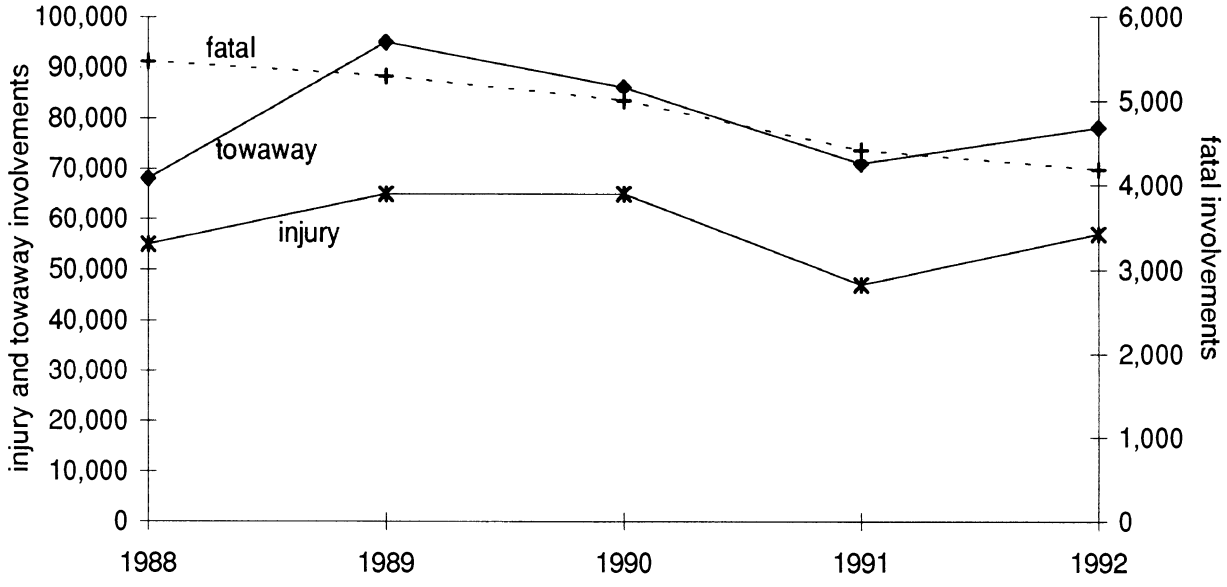
Figure II-1 shows annual estimates of fatal, injury, and towaway involvements for 1988-1992. Though the year-to-year differences in injury and towaway involvements are generally not statistically significant, the

Table II-2 Truck Involvements by Accident Severity, 1988-1992

	Fatal		Injury		Towaway		Total	
Year	N	%	N	%	N	%	N	%
1988	5,476	4.3	55,000	42.8	68,000	53.0	128,000	100.0
1989	5,300	3.2	65,000	39.3	95,000	57.5	165,000	100.0
1990	5,013	3.2	65,000	41.7	86,000	55.1	156,000	100.0
1991	4,420	3.6	47,000	38.2	71,000	58.2	123,000	100.0
1992	4,185	3.0	57,000	41.0	78,000	56.0	139,000	100.0

Sources: 1988-1992 TIFA, 1988-1992 GES

Figure II-1 Fatal, Injury, and Towaway Involvements, 1988-1992



Sources: 1988-1992 TIFA, 1988-1992 GES

differences between 1990 and 1991 are. Injury involvements decreased from 65,000 to 47,000 and all involvements decreased from 156,000 to 123,000. Although the overall decline in involvements from 1989 to 1992 is not statistically significant, it parallels the decline in fatal involvements, which is well-established. (The 1988 data year was the first year for GES. Sample sizes were small for trucks in that year, consequently population estimates are less reliable.)

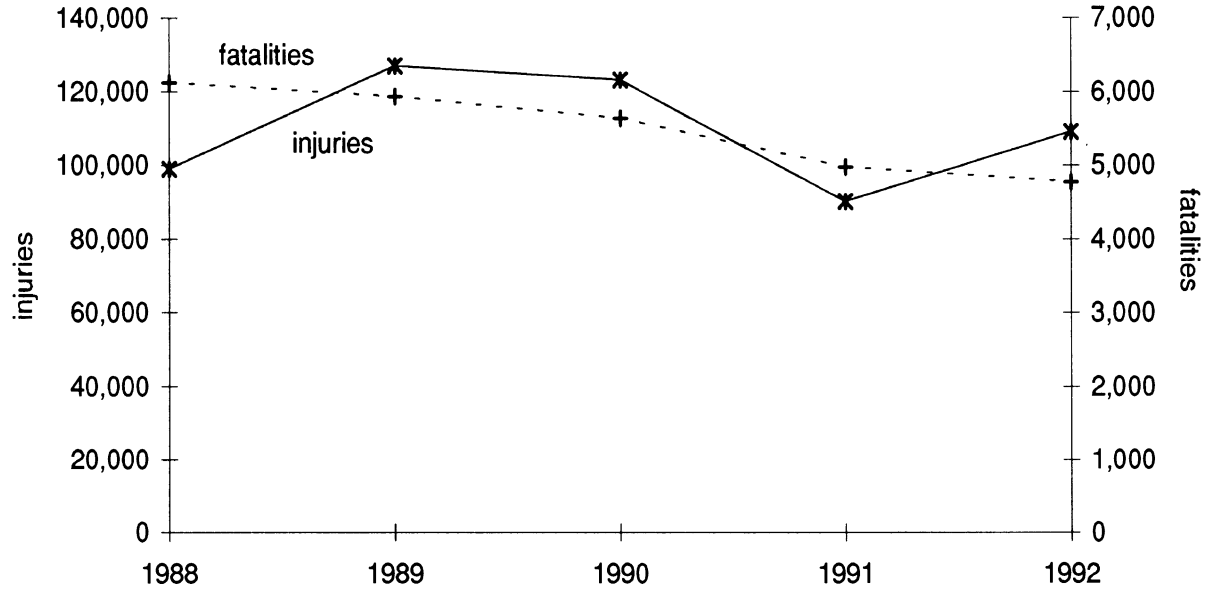
Table II-3 shows the number of persons killed and estimated number of persons injured in truck accidents, 1988-1992. The fatality column is from the TIFA files. For fatalities, the decline is marked and substantial—over 1,300 fewer people lost their lives in truck-involved accidents in 1992 than in 1988. Discounting the 1988 estimate from GES, the estimated number of injuries also shows a substantial, though not statistically significant, decline from 1989 to 1992. The decline in injuries from 1990 to 1991 is statistically significant, however. Figure II-2 shows the estimated number of fatalities and injuries.

Table II-3 Total Fatalities and Injuries in Truck Accidents 1988-1992

	Fatalities		Injuries		Total	
Year	N	% change	N	% change	N	% change
1988	6,112		99,000		106,000	
1989	5,934	-3.0	127,000	21.6	133,000	20.5
1990	5,635	-5.3	123,000	-3.2	128,000	-3.3
1991	4,974	-13.3	90,000	-35.8	95,000	-34.7
1992	4,767	-4.3	109,000	17.2	114,000	16.3

Sources: 1988-1992 TIFA, 1988-1992 GES

Figure II-2 Fatalities and Injuries, 1988-1992



Sources: 1988-1992 TIFA, 1988-1992 GES

Fatal involvements by configuration

The distribution of trucks involved in fatal accidents by combination type has been quite stable over time (table II-4). In each year between 1988 and 1992, about 30% of the trucks were single-unit, about 65% pulled one trailer, and fewer than 5% were multi-trailer. The multi-trailer category includes straight trucks with more than one trailer and tractors pulling three trailers, but the large majority of that category is the tractor-semitrailer, full-trailer combination. Despite an increasing reliance on tractors pulling two trailers ("doubles") in hauling freight, the annual proportion of fatal multi-trailer involvements has remained steady, and the number of their involvements has actually declined, from 236 in 1988 to 189 in 1992.

Table II-4 Combination Type for Fatal Involvements, 1988-1992

	Single-Unit		One-Trailer		Multi-Trailer		Unknown		Total	
Year	N	%	N	%	N	%	N	%	N	%
1988	1,550	28.3	3,574	65.3	236	4.3	116	2.1	5,476	100.0
1989	1,561	29.5	3,436	64.8	220	4.2	83	1.6	5,300	100.0
1990	1,477	29.5	3,241	64.7	203	4.0	92	1.8	5,013	100.0
1991	1,314	29.7	2,857	64.6	175	4.0	74	1.7	4,420	100.0
1992	1,257	30.0	2,660	63.6	189	4.5	79	1.9	4,185	100.0

Sources: 1988-1992 TIFA, 1988-1992 FARS

Table II-5 shows the number of involvements for each truck combination in each State in 1992. The table is restricted to fatal involvements, since data on the state in which the accident occurred is available only for fatal accidents. (Once the SAFETYNET accident system is fully implemented, State data will be available for all accident severities.) Four States, California, Texas, Florida, and Pennsylvania, accounted for 1,123 involvements, or 27% of total fatal truck involvements. (Those four States also account for 29% of the population of the United States.) Alaska, Hawaii, Rhode Island, and the District of Columbia had the fewest fatal involvements, with a total of just 16 among them. One-trailer combinations had more fatal involvements than any other configuration in all but five States (Connecticut, Maine, Massachusetts, New Hampshire, and New York), which are all located in the densely populated Northeast. Multi-trailer involvements were found more often in the western States. California recorded 59 multi-trailer fatal involvements, by far the largest number and 31.2% of all multi-trailer involvements. Texas, Ohio, and Washington were the three states with the next highest counts, though together they accounted for only 31 multi-trailer involvements.

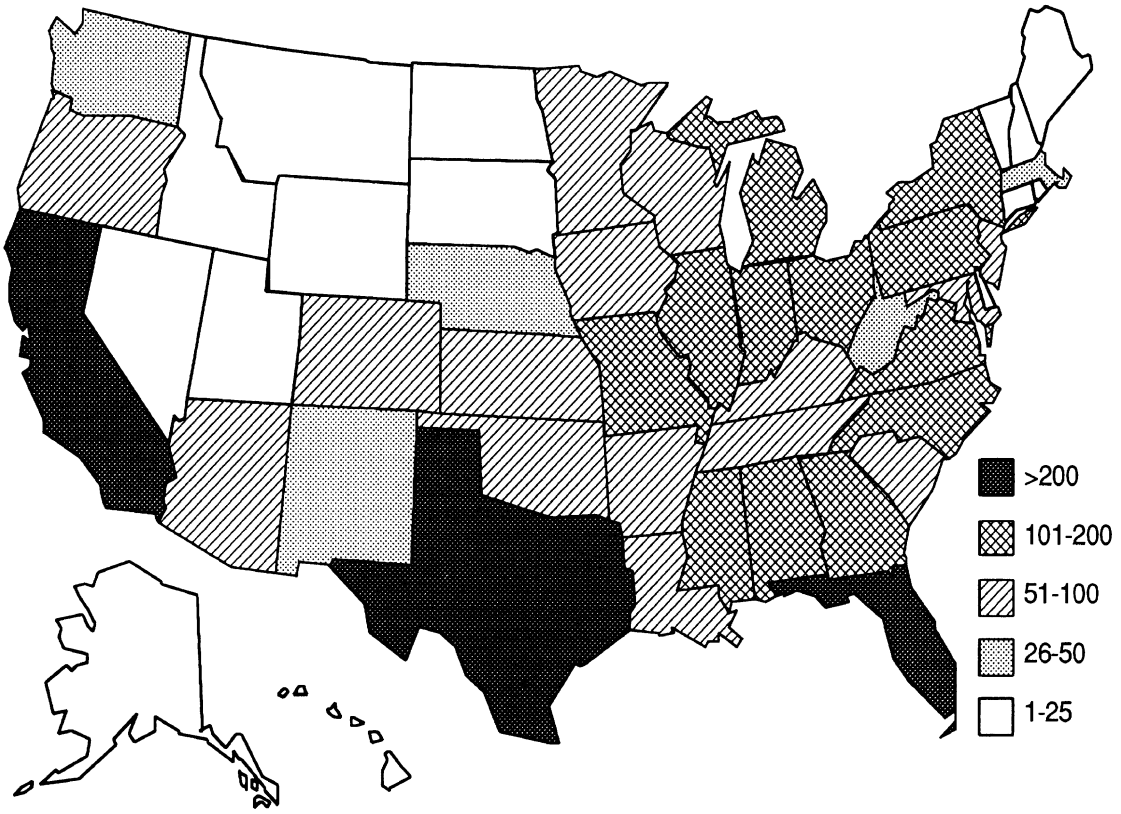
Table II-5 Fatal Involvements by State and Combination Type, 1992

State	Single-Unit		One-Trailer		Multi-Trailer		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
Alabama	40	3.2	94	3.5	2	1.1	0	0.0	136	3.2
Alaska	0	0.0	3	0.1	1	0.5	0	0.0	4	0.1
Arizona	15	1.2	44	1.7	8	4.2	0	0.0	67	1.6
Arkansas	14	1.1	69	2.6	2	1.1	0	0.0	85	2.0
California	108	8.6	206	7.7	59	31.2	0	0.0	373	8.9
Colorado	13	1.0	40	1.5	2	1.1	0	0.0	55	1.3
Connecticut	13	1.0	9	0.3	0	0.0	0	0.0	22	0.5
Delaware	8	0.6	13	0.5	0	0.0	0	0.0	21	0.5
D.C.	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Florida	94	7.5	146	5.5	6	3.2	0	0.0	246	5.9
Georgia	55	4.4	113	4.2	5	2.6	1	1.3	174	4.2
Hawaii	1	0.1	5	0.2	0	0.0	0	0.0	6	0.1
Idaho	6	0.5	16	0.6	2	1.1	0	0.0	24	0.6
Illinois	46	3.7	103	3.9	4	2.1	0	0.0	153	3.7
Indiana	29	2.3	95	3.6	2	1.1	0	0.0	126	3.0
Iowa	17	1.4	41	1.5	2	1.1	0	0.0	60	1.4
Kansas	16	1.3	36	1.4	2	1.1	0	0.0	54	1.3
Kentucky	42	3.3	54	2.0	0	0.0	0	0.0	96	2.3
Louisiana	19	1.5	60	2.3	2	1.1	0	0.0	81	1.9
Maine	10	0.8	8	0.3	0	0.0	0	0.0	18	0.4
Maryland	26	2.1	37	1.4	0	0.0	0	0.0	63	1.5
Massachusetts	17	1.4	12	0.5	2	1.1	0	0.0	31	0.7
Michigan	38	3.0	72	2.7	8	4.2	0	0.0	118	2.8
Minnesota	13	1.0	52	2.0	1	0.5	0	0.0	66	1.6
Mississippi *	3	0.2	27	1.0	1	0.5	74	93.7	105	2.5
Missouri	35	2.8	77	2.9	7	3.7	0	0.0	119	2.8
Montana	4	0.3	12	0.5	7	3.7	0	0.0	23	0.5
Nebraska	13	1.0	18	0.7	2	1.1	0	0.0	33	0.8
Nevada	7	0.6	13	0.5	3	1.6	0	0.0	23	0.5
New Hampshire	9	0.7	9	0.3	0	0.0	0	0.0	18	0.4
New Jersey	27	2.1	49	1.8	0	0.0	1	1.3	77	1.8
New Mexico	8	0.6	36	1.4	5	2.6	0	0.0	49	1.2
New York	79	6.3	67	2.5	1	0.5	2	2.5	149	3.6
N.Carolina	44	3.5	109	4.1	2	1.1	0	0.0	155	3.7
N.Dakota	6	0.5	7	0.3	1	0.5	0	0.0	14	0.3
Ohio	51	4.1	118	4.4	11	5.8	0	0.0	180	4.3
Oklahoma	21	1.7	45	1.7	0	0.0	0	0.0	66	1.6
Oregon	10	0.8	40	1.5	4	2.1	0	0.0	54	1.3
Pennsylvania	60	4.8	118	4.4	5	2.6	1	1.3	184	4.4
Rhode Island	2	0.2	4	0.2	0	0.0	0	0.0	6	0.1
S.Carolina	21	1.7	58	2.2	1	0.5	0	0.0	80	1.9
S.Dakota	2	0.2	14	0.5	1	0.5	0	0.0	17	0.4
Tennessee	26	2.1	73	2.7	0	0.0	0	0.0	99	2.4
Texas	86	6.8	223	8.4	11	5.8	0	0.0	320	7.6
Utah	1	0.1	18	0.7	1	0.5	0	0.0	20	0.5
Vermont	3	0.2	12	0.5	0	0.0	0	0.0	15	0.4
Virginia	43	3.4	71	2.7	1	0.5	0	0.0	115	2.7
Washington	11	0.9	29	1.1	9	4.8	0	0.0	49	1.2
W.Virginia	18	1.4	26	1.0	2	1.1	0	0.0	46	1.1
Wisconsin	25	2.0	53	2.0	0	0.0	0	0.0	78	1.9
Wyoming	2	0.2	6	0.2	4	2.1	0	0.0	12	0.3
Total	1,257	100.0	2,660	100.0	189	100.0	79	100.0	4,185	100.0

* Truck configuration is generally unavailable for Mississippi because Mississippi does not release police reports to the TIFA project.
Sources: 1992 TIFA, 1992 FARS

Figure II-3 shows the distribution of all fatal truck involvements in the United States in 1992. The distribution reflects both population size and truck usage. California, Texas, Florida, and Pennsylvania had the greatest number of fatal truck involvements, while the New England States and the States of the upper Far West had the fewest. The States of the upper Midwest also had large numbers of involvements, reflecting both population size and industrial concentration.

Figure II-3 Fatal Truck Involvements, 1992

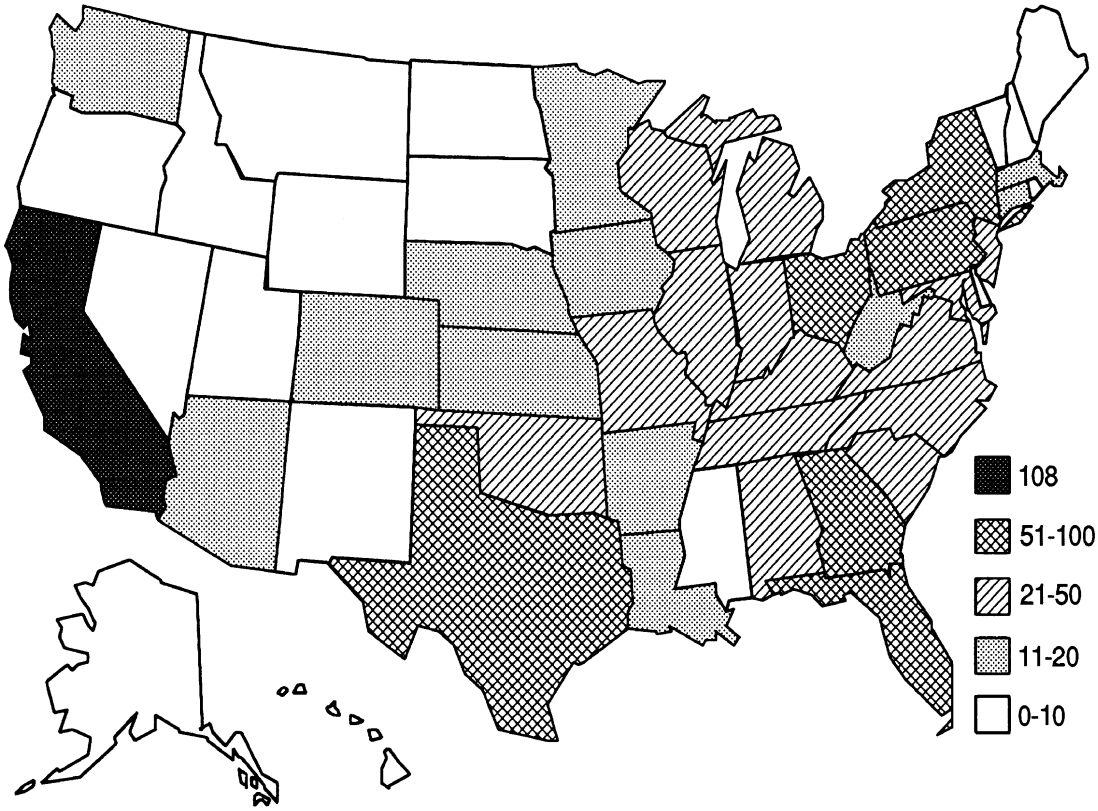


Sources: 1992 TIFA, 1992 FARS

The geographical distribution of single-unit trucks involved in a fatal accident is shown in figure II-4. Of the total of 4,185 trucks involved in a fatal accident, 1,257 were single-unit trucks.

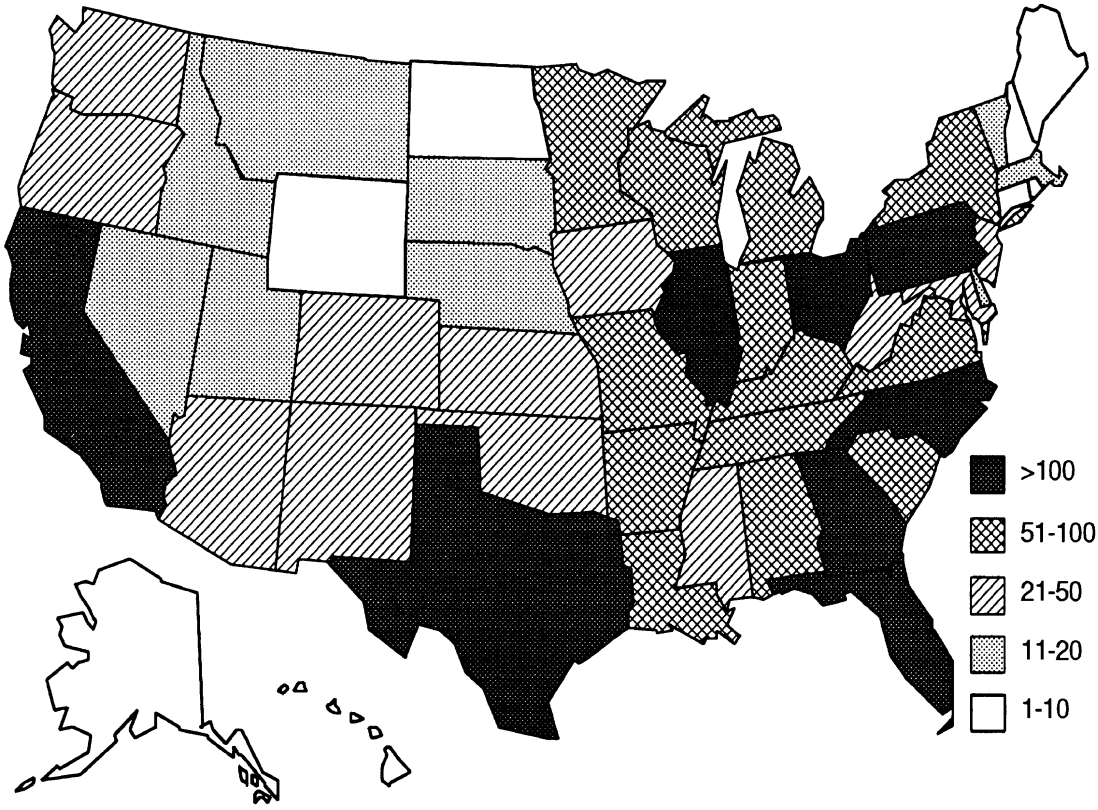
One-trailer combinations make up the majority of all truck fatal involvements, so figure II-5 is similar to figure II-3. California and Texas had the largest number of one-trailer fatal involvements in 1992; one-trailer fatal involvements were also concentrated in the industrial States of the Midwest.

Figure II-4 Single-Unit Fatal Truck Involvements, 1992



Sources: 1992 TIFA, 1992 FARS

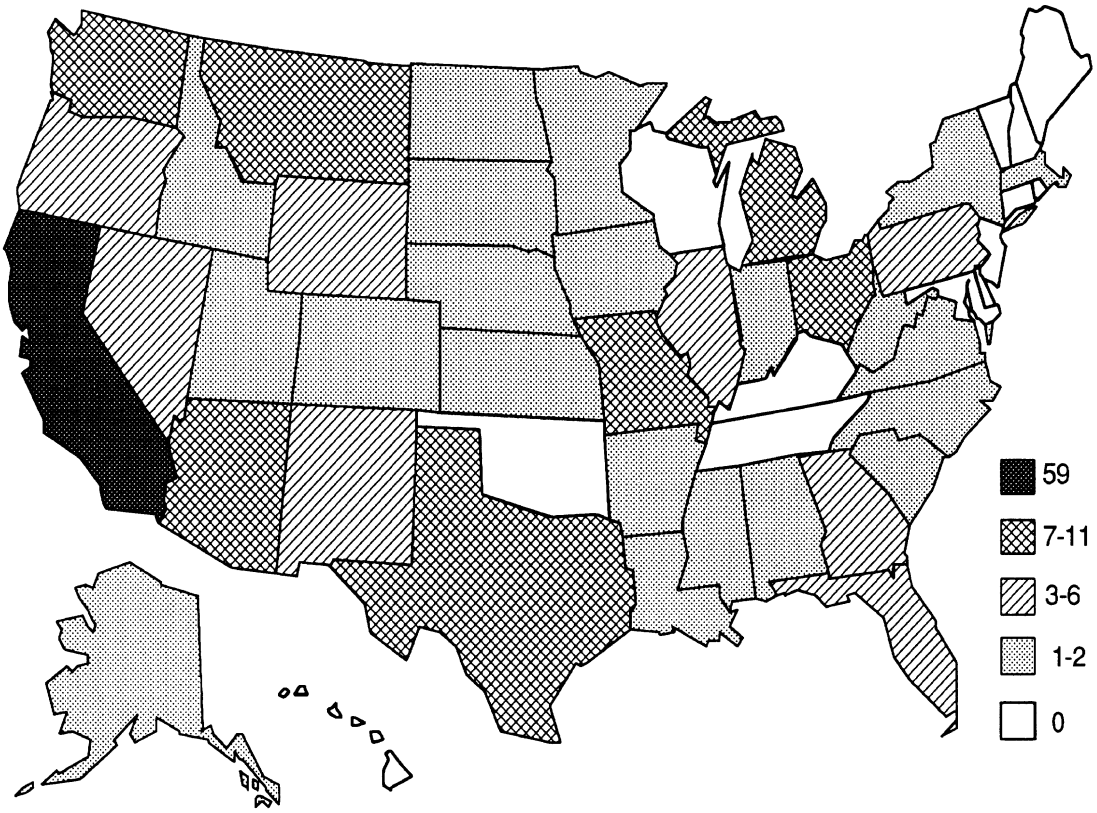
Figure II-5 One-Trailer Fatal Truck Involvements, 1992



Sources: 1992 TIFA, 1992 FARS

The pattern of multi-trailer fatal involvements across the U.S. differs signficantly from either all fatal involvements or any of the other combination types. Multi-trailer involvements were heavily concentrated in the West and especially in California. California had 59 fatal involvements of multi-trailer trucks in 1992, while Texas and Ohio were the next highest States with eleven each. Thirteen States and the District of Columbia recorded no multi-trailer fatal involvements, nine counted only one, and twelve had only two.

Figure II-6 Multi-Trailer Fatal Truck Involvements, 1992



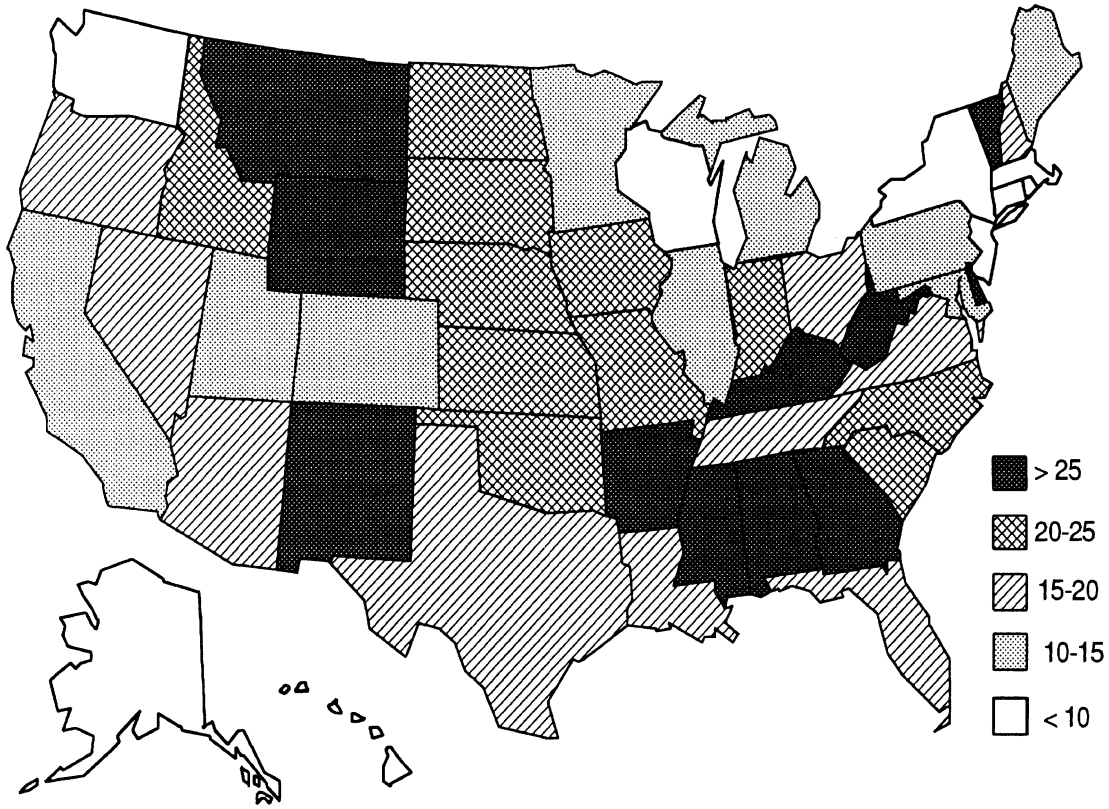
Sources: 1992 TIFA, 1992 FARS

Fatal involvements per capita

Finally, figure II-7 provides a context for interpreting the previous maps. It shows the rate of fatal truck involvements per million population in each State. Note that the States with the greatest number of fatal involvements, i.e., California, Texas, and Florida, have low or average involvements per million population. In contrast, some States with relatively few fatal involvements have among the highest rates of involvement per million population.

There are many methods of measuring "exposure" to traffic accidents. Truck involvements per million population is just one of them. The purpose of figure II-7 is not to measure "traffic safety" in the States, but instead to "correct" the previous figures for population the States. The total number of fatal truck involvements in a State is related to population size as well as many other factors.

Figure II-7 Fatal Truck Involvements per Million Population, 1992



Sources: 1992 TIFA, 1992 FARS; *Statistical Abstract 1992*

III. Truck Accidents

This section presents statistics describing the environment in which truck traffic accidents occurred in 1992. All the tables in this section show counts and proportions of vehicles by features of the accident environment.

Highlights of this section:

- Almost 90% of truck accident involvements occurred during the work week
- 77.6% of truck involvements occurred with no adverse weather conditions; 82.2% of fatal involvements occurred with no adverse weather conditions
- 70.1% of all truck involvements and 77.5% of fatal involvements occurred on dry roads
- 26.4% of fatal involvements occurred in the dark compared with 11.9% of non-fatal involvements
- 28.5% of the fatal involvements of one-trailer trucks and 43.9% of multi-trailer trucks occurred on limited access (Interstate-quality) roads
- Head-on collision was identified in 23.2% of fatal involvements compared with only 3.1% of all truck accident involvements
- A collision with a pedestrian or bicyclist was identified in 8.6% of fatal involvements, but only 1.1% of all involvements

Month, weekday, and time of day

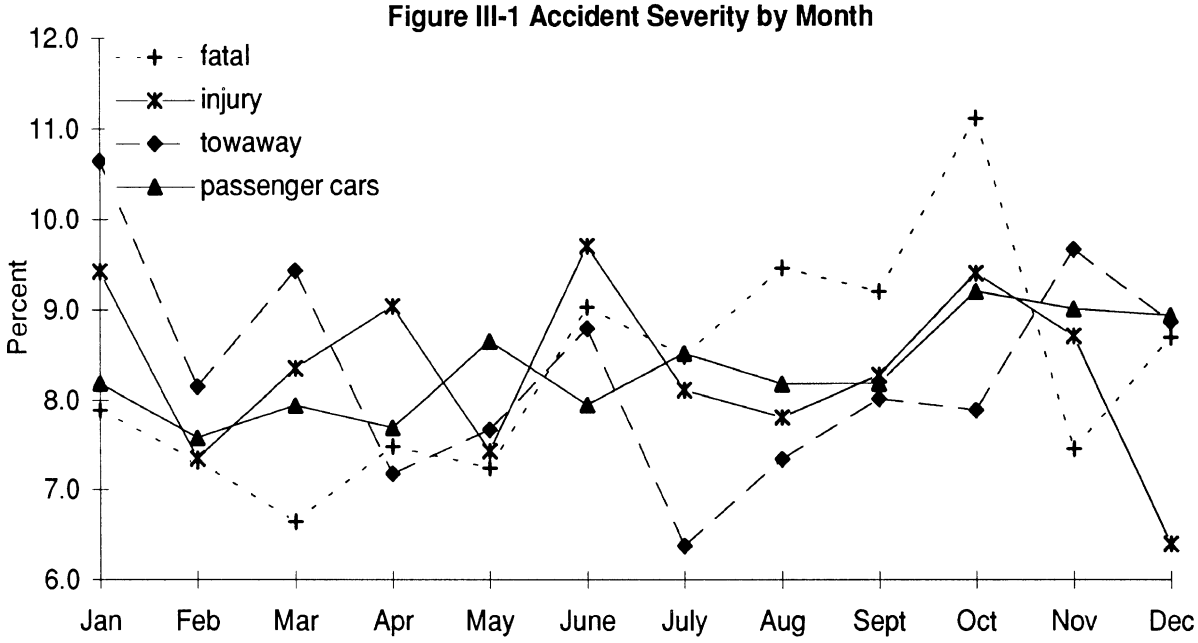
Fatal truck involvements appear to follow a seasonal pattern, with fewer involvements in the winter months and more in August through October. In 1992, March had the fewest fatal truck involvements with 278, while October had the greatest number, 465, a difference of 67%. The pattern of injury and towaway involvements is not as clear, though the lack of clarity may be due to relatively small sample sizes in GES. The monthly distribution of passenger car involvements is included in figure III-1 for comparison.

Table III-1 Accident Severity by Month

	Fatal		Injury		Towaway		All	
Month	N	%	N	%	N	%	N	%
January	330	7.9	5,000	9.4	8,000	10.6	14,000	10.1
February	306	7.3	4,000	7.3	6,000	8.1	11,000	7.8
March	278	6.6	5,000	8.4	7,000	9.4	12,000	8.9
April	313	7.5	5,000	9.0	6,000	7.2	11,000	7.9
May	303	7.2	4,000	7.4	6,000	7.7	11,000	7.6
June	378	9.0	6,000	9.7	7,000	8.8	13,000	9.2
July	355	8.5	5,000	8.1	5,000	6.4	10,000	7.2
August	396	9.5	4,000	7.8	6,000	7.3	11,000	7.6
September	385	9.2	5,000	8.3	6,000	8.0	11,000	8.2
October	465	11.1	5,000	9.4	6,000	7.9	12,000	8.6
November	312	7.5	5,000	8.7	8,000	9.7	13,000	9.2
December	364	8.7	4,000	6.4	7,000	8.9	11,000	7.8
Total	4,185	100.0	57,000	100.0	78,000	100.0	139,000	100.0

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure III-1 Accident Severity by Month



Sources: 1992 TIFA, 1992 GES, 1992 FARS

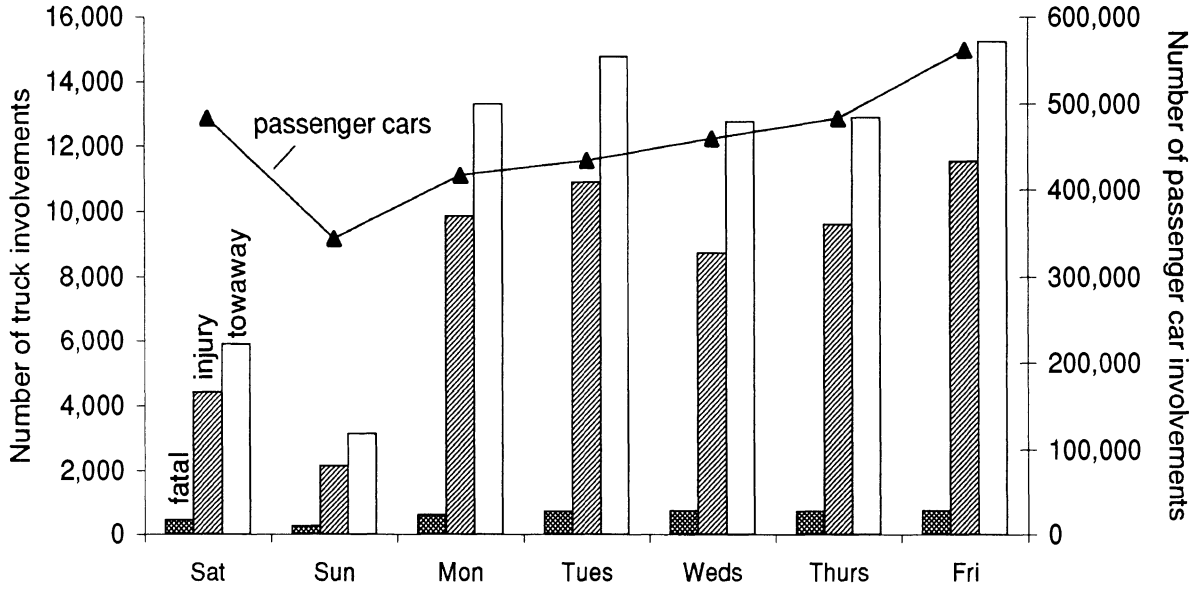
Most truck involvements in traffic accidents occurred during the work week. Almost 90% of truck involvements took place between Monday and Friday in 1992. Friday had the greatest number of truck involvements, with 725 fatal, an estimated 12,000 injury, and an estimated 15,000 towaway involvements (table III-2). The number of trucks involved in traffic accidents declined steeply on the weekend, though note that Saturday had about twice as many involvements as Sunday. The weekend proportion was higher for fatal truck involvements than for nonfatal, with 16.3% of fatal truck involvements occurring on Saturday or Sunday, compared with 11.7% of all truck involvements. On weekends, many businesses are closed, though trucks used for long-distance freight haulage continue to operate. These trucks use roads with higher travel speeds, where traffic accidents are more likely to include a fatality. Figure III-2 includes passenger car involvements by day of week for comparison.

Table III-2 Day of Week by Accident Severity

	Fatal		Injury		Towaway		All	
Day	N	%	N	%	N	%	N	%
Saturday	439	10.5	4,000	7.7	6,000	7.6	11,000	7.7
Sunday	244	5.8	2,000	3.8	3,000	4.0	6,000	4.0
Monday	599	14.3	10,000	17.2	13,000	17.1	24,000	17.0
Tuesday	721	17.2	11,000	19.1	15,000	18.9	26,000	18.9
Wednesday	741	17.7	9,000	15.3	13,000	16.4	22,000	16.0
Thursday	716	17.1	10,000	16.8	13,000	16.5	23,000	16.6
Friday	725	17.3	12,000	20.2	15,000	19.5	27,000	19.7
Total	4,185	100.0	57,000	100.0	78,000	100.0	139,000	100.0

Sources: 1992 TIFA, 1992 GES, 1992 FARS

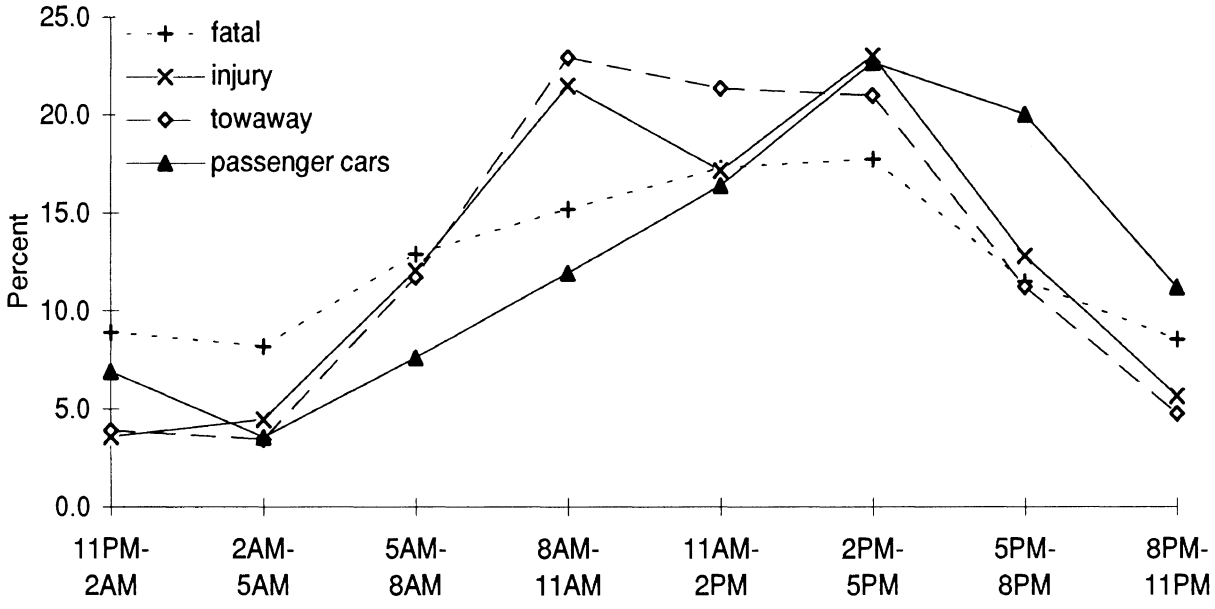
Figure III-2 Day of Week by Accident Severity



Sources: 1992 TIFA, 1992 GES, and 1992 FARS

The distribution of truck involvements over the course of a day also varies greatly. Figure III-3 shows the distribution of each accident severity in 1992 by time of day. Passenger car involvements are also included for comparison. About 20 to 22% of both injury and towaway truck involvements occurred in the three-hour period between 8 AM and 11 AM. The proportion of involvements declined for the next three hour period (most clearly for injury accidents), and then increased in the period between 2 PM and 5 PM. The percentage of injury and towaway involvements then declined sharply overnight. The distribution of fatal involvements followed the same general trend, though the increase was not as great during normal working hours and fatal involvements declined much less overnight compared with the other accident severities. The proportion of fatal involvements was about twice as high as nonfatal involvements for each successive three-hour period between 8 PM and 5 AM. Why is the proportion of fatal involvements higher at night? During the day, a substantial amount of travel is related to pickup and delivery operations. At night, more travel is on high-speed roads, carrying freight between cities. Driver fatigue and shortened sight distances due to darkness are also a problem. In such circumstances, if an accident occurs, it is more likely to be serious.

Figure III-3 Time of Day by Accident Severity



Sources: 1992 TIFA, 1992 GES, 1992 FARS

Weather, road, and light condition

Almost 78% of all U.S. truck involvements in 1992 occurred with no adverse weather conditions (table III-3). Rain was the most common type of adverse weather, accounting for 16.3% of all truck accident involvements. Snow was falling in only 3.6% of the involvements and was somewhat more likely for towaway (4.1%) than for injury (2.9%) or fatal (2.4%) involvements. For fatal involvements, the proportion of weather problems was actually lower than for injury and towaway involvements. There were no adverse conditions in 82.2% of all fatal involvements and rain was coded for only 11.8%. This may indicate that drivers generally operate their vehicles more carefully and slowly in bad weather, so that if an accident occurs, it is less likely to be serious.

Table III-3 Weather Condition by Accident Severity

	Fatal		Injury		Towaway		All	
Weather	N	%	N	%	N	%	N	%
No adverse	3,442	82.2	45,000	77.9	60,000	77.1	108,000	77.6
Rain	495	11.8	9,000	16.5	13,000	16.4	23,000	16.3
Snow	101	2.4	2,000	2.9	3,000	4.1	5,000	3.6
Fog	113	2.7	1,000	1.2	1,000	1.3	2,000	1.3
Other	18	0.4	1,000	1.2	1,000	0.8	1,000	1.0
Total	4,185	100.0	57,000	100.0	78,000	100.0	139,000	100.0

Note: Includes 6 fatal involvements with unknown weather conditions.
Sources: 1992 TIFA, 1992 GES, 1992 FARS

Table III-4 shows road conditions by accident severity for truck accident involvements in 1992. Naturally, the distribution of road conditions is quite similar to that of weather conditions. Most truck accident involvements occurred on dry roads. The proportion of fatal involvements on dry roads was higher than that of injury or towaway involvements. Though the weather was snowing or sleeting in less than 4% of all involvements, roads were snowy or icy in 5.6% of all involvements.

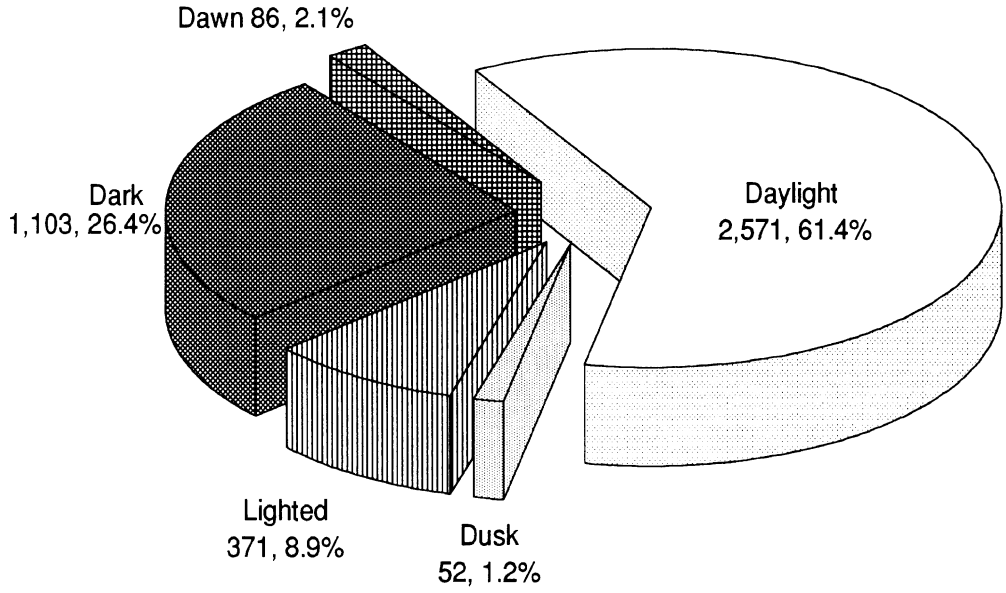
Table III-4 Road Condition by Accident Severity

Road	Fatal		Injury		Towaway		All	
condition	N	%	N	%	N	%	N	%
Dry	3,242	77.5	40,000	70.0	54,000	69.8	98,000	70.1
Wet	773	18.5	15,000	25.4	18,000	23.5	34,000	24.2
Snow/slush	62	1.5	1,000	1.3	1,000	0.8	1,000	1.0
Ice	94	2.2	2,000	3.0	5,000	5.9	6,000	4.6
Total	4,185	100.0	57,000	100.0	78,000	100.0	139,000	100.0

Note: Includes fewer than 500 cases with other or unknown road conditions.
Sources: 1992 TIFA, 1992 GES, 1992 FARS

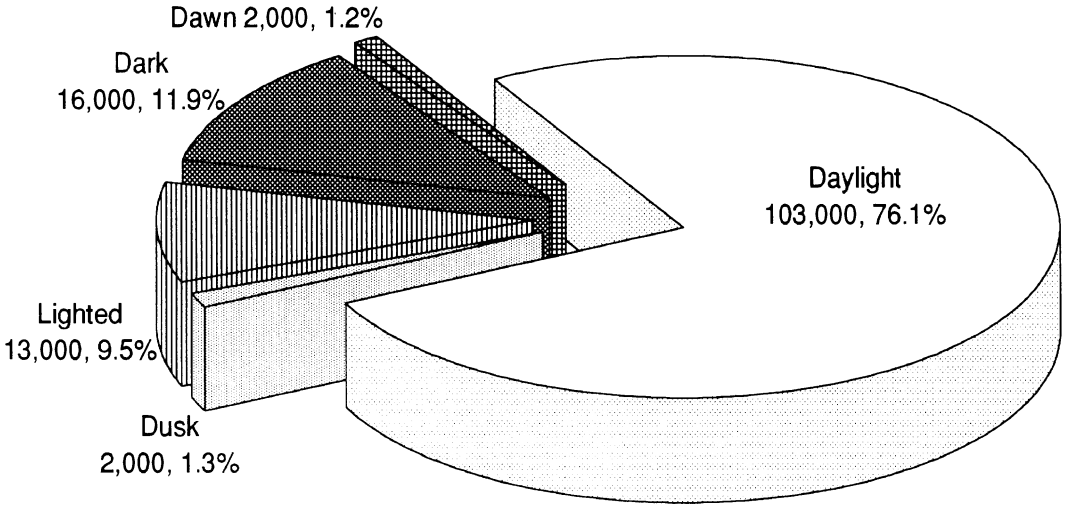
Figures III-4 and III-5 show light condition for fatal and nonfatal (injury and towaway) involvements in 1992. Most involvements, both fatal and nonfatal, occurred during daylight or on lighted roads. However, fatal involvements had a higher proportion of "dark" and "dawn," while nonfatal involvements were much more likely to occur in daylight. In fact, 26.4% of truck involvements in a fatal accident occurred in the dark, compared with only 11.9% of truck involvements in a nonfatal accident. This is consistent with the time of day distribution shown in figure III-3. Truck travel at night is more likely to consist of long-haul trips on roads where travel speeds are high.

Figure III-4 Light Condition for Fatal Truck Accidents



Sources: 1992 TIFA, 1992 FARS

Figure III-5 Light Condition for Non-Fatal Truck Accidents



Source: 1992 GES

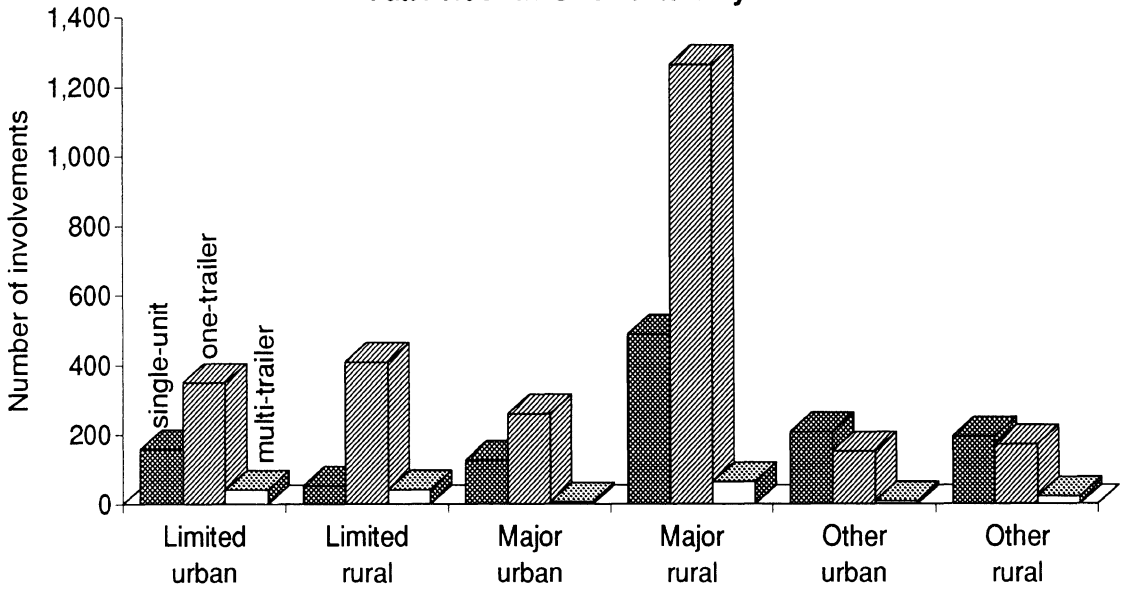
Road type and area type

Road type and area type capture important features of a truck's operating environment. Roads in urban areas typically have denser traffic and lower speeds than comparable road classes in rural areas. Limited access roads provide one-way traffic streams (which reduce the opportunity for head-on collisions), high design standards, and controlled access. Limited access roads include the Interstate highway system as well as other roads with divided traffic streams and controlled access. Major arterials, as defined here, are U.S. and State numbered routes that are not limited access, and so typically incorporate fewer safety features.

Note: Only trucks involved in fatal accidents are included in this section, since a detailed road type variable is only available in the TIFA and FARS files.

Figure III-6 shows involvement frequencies of different truck configurations in fatal accidents in 1992. Fatal involvements of one-trailer trucks were concentrated on major arterial roads in rural areas, though limited access roads in both rural and urban areas also accounted for a substantial number. The number of one-trailer involvements on rural major arterials is striking. Travel speeds on such roads are typically high, since they are in rural areas, but they are not as safe as limited access roads. Single-unit truck involvements, primarily straight trucks, also were relatively concentrated on rural major arterials. In addition, single-unit trucks had substantial numbers of involvements on "other" roads (i.e., not limited access or major arterial). The involvements of multi-trailer trucks occurred primarily on rural and urban limited access roads and rural major arterials.

Figure III-6 Road and Area Type by Combination Type
Fatal Truck Involvements Only



Sources: 1992 TIFA, 1992 FARS

Compared with the other combination types, single-unit fatal involvements were more uniformly distributed across the road and area types. Summing the appropriate categories in table III-5, almost 32% of single-unit involvements occurred on "other" roads, including both urban and rural areas, compared with about 12% for one-trailer combinations and about 16% for multi-trailer combinations. Fatal involvements of one-trailer combinations occurred primarily on limited access roads and major arterials, with 28.5% on all limited access roads and an additional 47.5% on rural major arterials. The fatal involvements of multi-trailer combinations were even more heavily concentrated on limited access roads, with 22.2% occurring on urban limited access roads and 21.7% on rural limited access roads.

As is the case for all other tables and figures in this publication, in the absence of exposure data, causal inferences cannot be drawn from these distributions. For example, the small frequency and proportion of multi-trailer fatal involvements on urban "other" roads does not indicate that multi-trailer combinations operate more safely on such roads. Multi-trailer combinations, primarily tractors pulling two trailers and some triples, are used mainly on limited access roads between cities and not on smaller urban roads.

Table III-5 Fatal Involvements by Road Class/Area Type and Truck Configuration

Road class/ area type	Single-Unit		One-Trailer		Multi-Trailer		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
Limited/urban	157	12.5	349	13.1	42	22.2	5	6.3	553	13.2
Limited/rural	53	4.2	409	15.4	41	21.7	6	7.6	509	12.2
Major/urban	127	10.1	261	9.8	7	3.7	0	0.0	395	9.4
Major/rural	489	38.9	1,263	47.5	65	34.4	56	70.9	1,873	44.8
Other/urban	207	16.5	151	5.7	8	4.2	3	3.8	369	8.8
Other/rural	194	15.4	172	6.5	22	11.6	9	11.4	397	9.5
Unknown	30	2.4	55	2.1	4	2.1	0	0.0	89	2.1
Total	1,257	100.0	2,660	100.0	189	100.0	79	100.0	4,185	100.0

Sources: 1992 TIFA, 1992 FARS

Manner of collision and first harmful event

A higher proportion of fatal involvements resulted from head-on collisions, compared with injury and towaway involvements (table III-6, figure III-7). Twenty-three percent of fatal truck involvements occurred in head-on collisions, compared with only 3.2% for injury and 2.1% for towaway accidents. In contrast, 30.2% of injury and 27.9% of towaway involvements were in rear-end collisions, compared with 17.5% of fatals. Sideswipes were also less serious, accounting for 4.3% of truck fatal involvements, but 10.8% of towaway involvements. An angle impact was the major collision type for all crash severities, coded for 32.9% of fatal involvements, 39.8% of injury involvements, and 33.6% of towaway involvements. The "single-vehicle" category includes cases where there was no collision with a vehicle in transport.

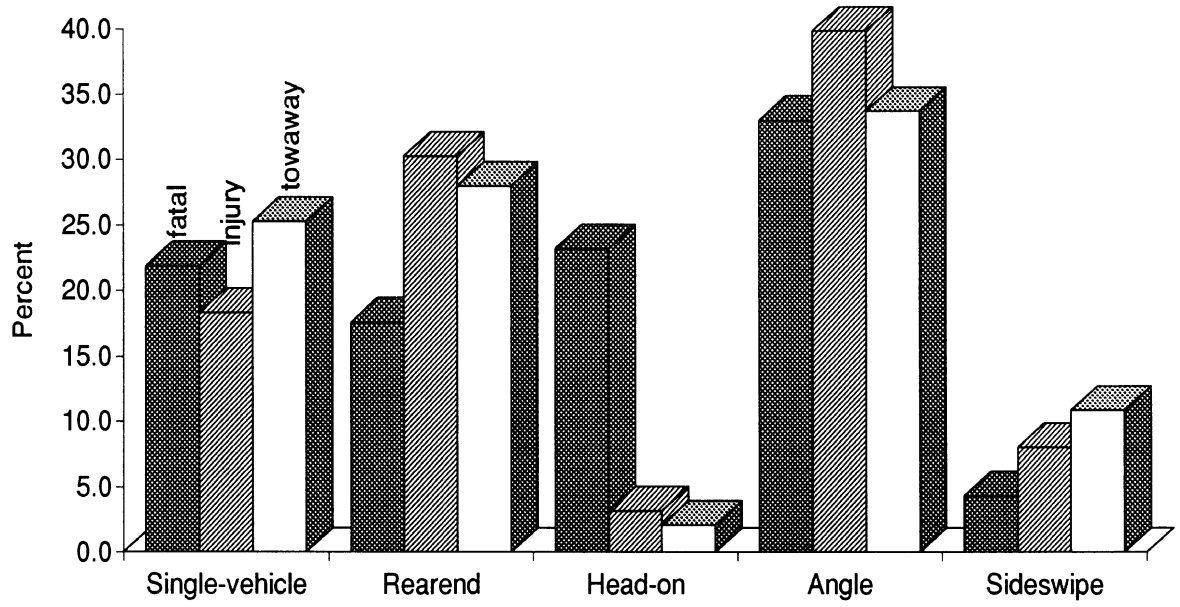
Table III-6 Manner of Collision by Accident Severity

Collision	Fatal		Injury		Towaway		All	
type	N	%	N	%	N	%	N	%
Single-vehicle	914	21.8	10,000	18.3	20,000	25.2	31,000	22.3
Rearend	734	17.5	17,000	30.2	22,000	27.9	40,000	28.6
Head-on	969	23.2	2,000	3.2	2,000	2.1	4,000	3.1
Angle	1,378	32.9	23,000	39.8	26,000	33.6	50,000	36.1
Sideswipe	180	4.3	5,000	8.0	8,000	10.8	13,000	9.5
Other	0	0.0	*	0.6	*	0.3	1,000	0.4
Unknown	10	0.2	*	*	*	*	*	*
Total	4,185	100.0	57,000	100.0	78,000	100.0	139,000	100.0

* GES estimate less than 500 or less than 0.05

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure III-7 Manner of Collision by Accident



Sources: 1992 TIFA, 1992 GES, 1992 FARS

First harmful event and accident severity

First harmful event reflects the first property-damaging or injury-producing event. For all accident severities, the most common first harmful event was a collision with a vehicle in transport. Collisions with fixed and non-fixed objects occurred in 9.2% and 1.6% of involvements, respectively. Non-fixed objects include railroad trains, animals, and parked motor vehicles. Fixed objects include bridges, guard rails, impact attenuators, road signs, and other features of the roadway, as well as trees, ditches, embankments, and the like. Rollover was coded for 5.5% of involvements and an "other non-collision" event was coded for 4.9%. Rollover includes any number of quarter-turns, including the vehicle simply turning onto its side. Non-collision events include a fire or explosion, immersion, gas inhalation, and falling from a vehicle.

Table III-7 First Harmful Event by Accident Severity

	Fatal		Injury		Towaway		All	
First harmful event	N	%	N	%	N	%	N	%
Collision:								
Vehicle in transport	3,271	78.2	47,000	81.7	58,000	74.7	108,000	77.7
Pedestrian/bicyclist	362	8.6	1,000	2.1	*	*	2,000	1.1
Non-fixed object	106	2.5	*	0.8	2,000	2.1	2,000	1.6
Fixed object	252	6.0	5,000	7.9	8,000	10.2	13,000	9.2
Non-collision								
Rollover	156	3.7	3,000	4.8	5,000	6.2	8,000	5.5
Other non-collision	38	0.9	2,000	2.7	5,000	6.7	7,000	4.9
Total	4,185	100.0	57,000	100.0	78,000	100.0	139,000	100.0

* GES estimate less than 500 or less than 0.05

Sources: 1992 TIFA, 1992 GES, 1992 FARS

IV. Vehicles: Trucks

This section presents statistics on the types of trucks involved in traffic accidents. The focus is primarily on **single-unit** (no trailers), **one-trailer**, and **multi-trailer** (more than one trailer) trucks. **Combination** trucks are also considered in one table, where they are defined as a truck-tractor or straight truck with any number of trailers.

Most of the tables and figures in this section are limited to fatal accidents because data about weights, lengths, cargo body type, and other details are only available for trucks involved in fatal accidents. Additional detail about trucks in non-fatal accidents will become available when the SAFETYNET accident system is fully implemented.

Highlights of the *Vehicles* section for 1992:

- 139,000 trucks were involved in traffic accidents
- 47.9% of trucks in traffic accidents were single-unit and 50.9% pulled at least one trailer
- 4,185 trucks were involved in an accident in which a fatality occurred
- 63% of trucks in fatal accidents were operated in interstate commerce
- 9.5% of single-unit trucks in fatal accidents were operated by Interstate Commerce Commission-authorized carriers, while 57.4% of one-trailer trucks and 63.0% of multi-trailer trucks were ICC-authorized
- 13.6% of trucks in fatal accidents rolled over, compared with 4.5% of trucks in injury accidents, and 3.4% in towaway accidents
- There were 202 trucks carrying hazardous materials involved in fatal accidents in 1992
- There were spills of hazardous materials from 30 of the 4,185 trucks involved in fatal accidents in 1992 (less than 1%)

Vehicle totals

An estimated 139,000 trucks were involved in traffic accidents in the U.S. in 1992, compared with 3,174,000 passenger cars (table IV-1) in traffic accidents. Almost 4,200 trucks were involved in an accident in which at least one fatality occurred, 57,000 where the most serious harm was a non-fatal injury transported from the scene for medical attention, and an additional 78,000 where at least one vehicle was towed.

The number of passenger cars involved in traffic accidents dwarfs the number of trucks, but truck accidents tend to be more serious. Fatal accidents accounted for 3.0% of all truck involvements, but only 0.8% of automobile accident involvements. There was one truck for every 23 passenger cars involved in an accident, but one truck for every 6 cars involved in a fatal accidents. Differences in mass help explain this disparity. Trucks can weigh up to 80,000 pounds when loaded, and more with permits or in certain States. Trucks greatly outweigh most other vehicles in an accident, increasing the probability of a fatality.

Table IV-1 Trucks and Passenger Cars by Accident Severity

Accident	Truck		Passenger car	
severity	N	%	N	%
Fatal	4,185	3.0	25,000	0.8
Injury	57,000	41.0	1,383,000	43.6
Towaway	78,000	56.1	1,766,000	55.6
Total	139,000	100.0	3,174,000	100.0

Sources: 1992 TIFA, 1992 GES, 1992 FARS

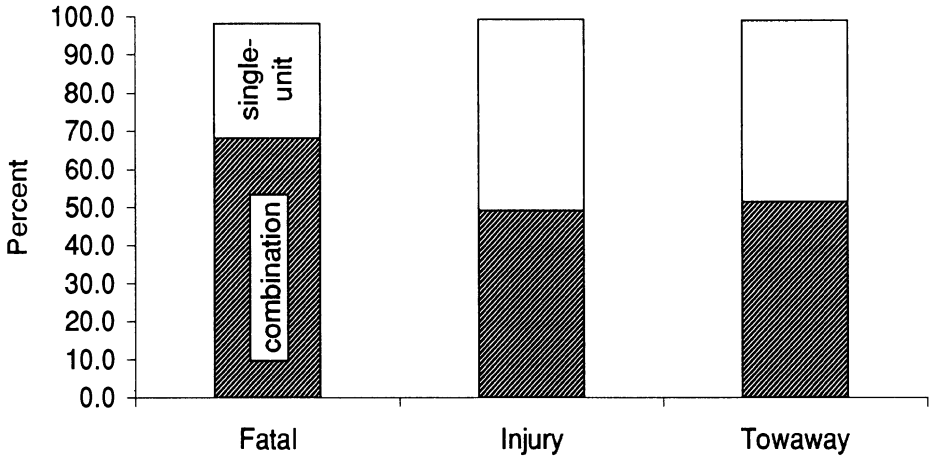
Table IV-2 shows the number of single-unit and combination trucks involved in an accident in 1992 by accident severity. (Combination trucks include all one-trailer and multi-trailer trucks.) Overall, about half of the trucks involved in an accident were single-unit (47.9%) and about half were combination trucks (50.9%). These proportions are about the same for injury accidents and for towaway accidents. But about 68.1% of trucks in fatal accidents were combination trucks (i.e., pulling one or more trailers), and only 30% were single-unit (figure IV-1). This difference could be due to the areas where trucks operate, since single-unit trucks often work in urban areas where travel speeds are lower, while combination trucks, typically a tractor pulling a semitrailer, travel more often in rural areas at higher speeds. Combination trucks have more fatal involvements on rural major arterial roads (see table III-5), where traffic speeds are generally high.

Table IV-2 Truck Configuration by Accident Severity

Accident	Single-Unit		Combination		Unknown		All	
severity	N	%	N	%	N	%	N	%
Fatal	1,257	30.0	2,849	68.1	79	1.9	4,185	100.0
Injury	29,000	49.9	28,000	49.2	1,000	1.0	57,000	100.0
Towaway	37,000	47.5	40,000	51.3	1,000	1.2	78,000	100.0
Total	67,000	47.9	71,000	50.9	2,000	1.1	139,000	100.0

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure IV-1 Distribution of Single-Unit and Combination Trucks for Accident Severity



Sources: 1992 TIFA, 1992 GES, 1992 FARS

Company type

Table IV-3 tabulates fatal truck involvements by company type for single-unit, one-trailer, and multi-trailer combinations. The table is limited to fatal involvements because carrier type information is only available for trucks involved in fatal accidents. Company type is categorized by whether the trucks operate in interstate commerce or only within a single State; within that classification, companies are classified as either private or for-hire, and, in interstate commerce, authorized or exempt. Almost 44% of all trucks in fatal accidents were operated by interstate for-hire carriers, 42.2% by authorized carriers and 1.7% by exempt carriers. With the addition of the 18.9% of trucks operated by interstate private carriers, almost 63% of trucks in fatal accidents were operated in interstate commerce. Most of the intrastate trucks were operated by private carriers; intrastate for-hire carriers account for only 8.4% of all truck fatal involvements.

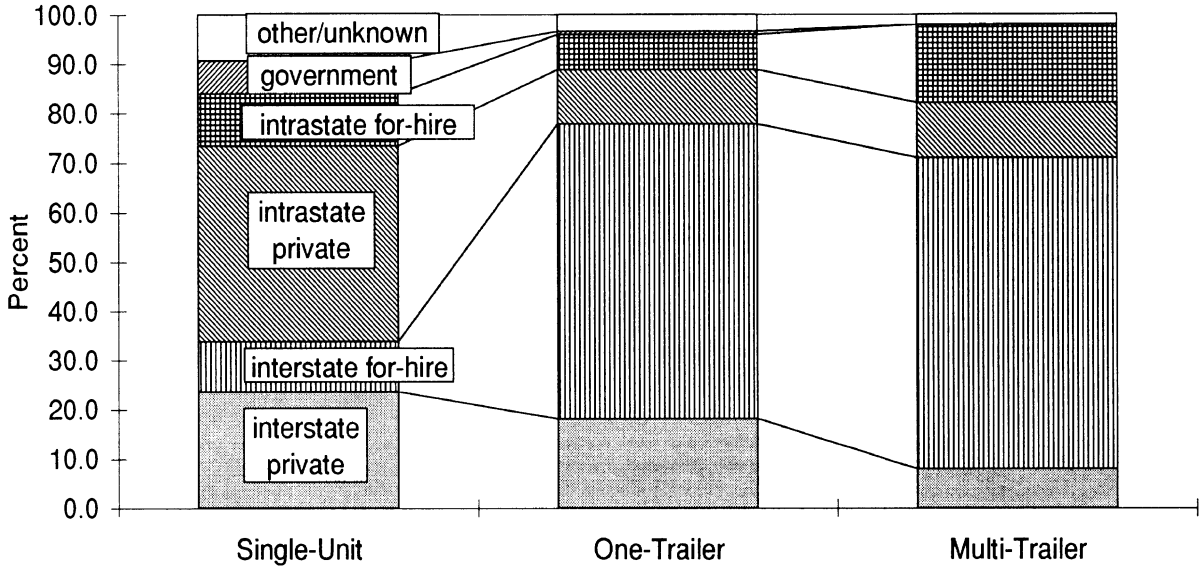
Table IV-3 Company Type by Truck Configuration
Fatal Truck Involvements Only

Company	Single-Unit		One-Trailer		Multi-Trailer		Unknown		All	
type	N	%	N	%	N	%	N	%	N	%
Interstate:										
Private	296	23.5	481	18.1	15	7.9	0	0.0	792	18.9
For-hire:										
Authorized	119	9.5	1,528	57.4	119	63.0	0	0.0	1,766	42.2
Exempt	11	0.9	60	2.3	0	0.0	0	0.0	71	1.7
Intrastate:										
Private	496	39.5	291	10.9	21	11.1	0	0.0	808	19.3
For-hire	134	10.7	189	7.1	30	15.9	0	0.0	353	8.4
Government	83	6.6	19	0.7	0	0.0	0	0.0	102	2.4
Daily rental	24	1.9	8	0.3	0	0.0	0	0.0	32	0.8
Unknown	94	7.5	84	3.2	4	2.1	79	100.0	261	6.2
Total	1,257	100.0	2,660	100.0	189	100.0	79	100.0	4,185	100.0

Source: 1992 TIFA

Figure IV-2 illustrates the differences in the distribution of company type by truck configuration among trucks involved in fatal accidents in 1992. Single-unit trucks, which are mainly straight trucks, were predominantly operated by intrastate private carriers (e.g., farmers or construction firms). The second largest fraction of single-unit trucks were operated by interstate-private carriers. Note also that almost all the government-owned trucks fell into the single-unit category. In contrast with single-unit trucks, one-trailer combinations (and even more so multi-trailer combinations) involved in fatal accidents were predominantly operated by companies that haul freight for-hire across State lines. Over 57% of one-trailer trucks in fatal accidents were interstate-authorized; the proportion of interstate-authorized rose to 63% for multi-trailer trucks. The proportion of intrastate for-hire trucks also was higher for multi-trailer trucks than for one-trailer trucks, 15.9% to 7.1%. Some States permit certain longer combination vehicles (LCVs), which has led to the development of specialized hauling services that operate entirely within those States.

Figure IV-2 Distribution of Company Type by Truck Configuration
Fatal Truck Involvements Only

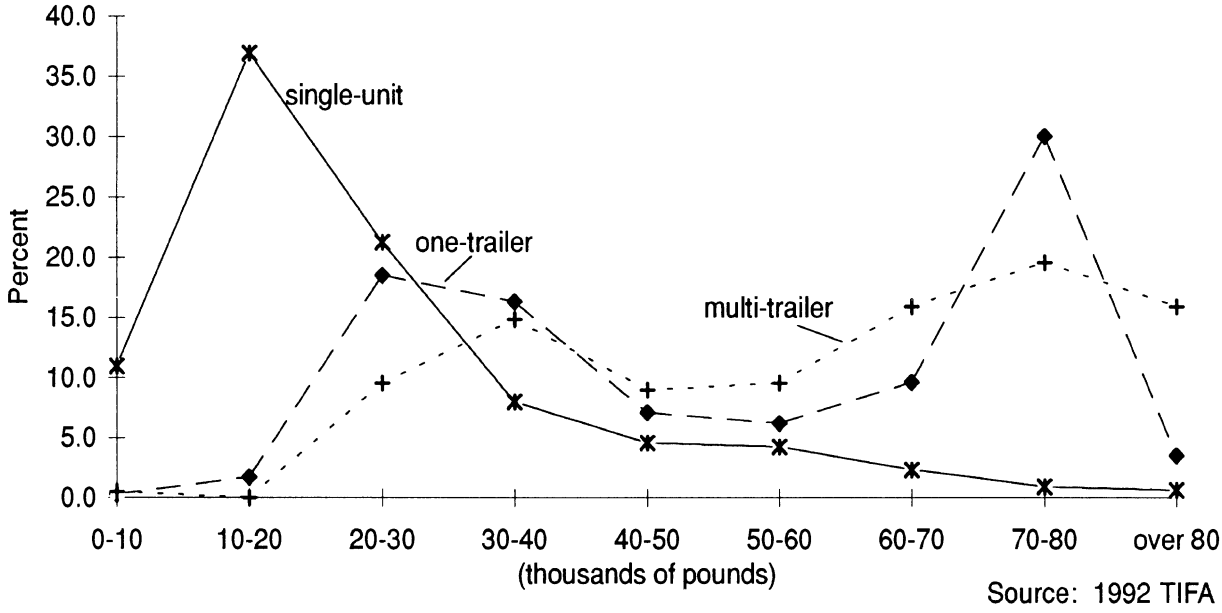


Source: 1992 TIFA

Weights and lengths

Figure IV-3 shows the distribution of the gross combination weight (GCW) of single-unit, one-trailer, and multi-trailer trucks involved in fatal accidents in 1992. About 11% of single-unit trucks involved in a fatal accident weighed under 10,000 pounds. Many of these were empty—an empty single-unit truck can weigh as little as 6,000 pounds. The proportion of single-unit trucks rose to a peak at 10-20,000 pounds and then declined sharply to the 30-40,000 pound category. Almost half the single-unit trucks had GCWs less than 20,000 pounds. Only a small number of single-unit trucks in fatal accidents weighed over 50,000 pounds, though some were found with weights up to 80,000 pounds.

Figure IV-3 Gross Combination Weight by Truck Configuration
Fatal Truck Involvements Only

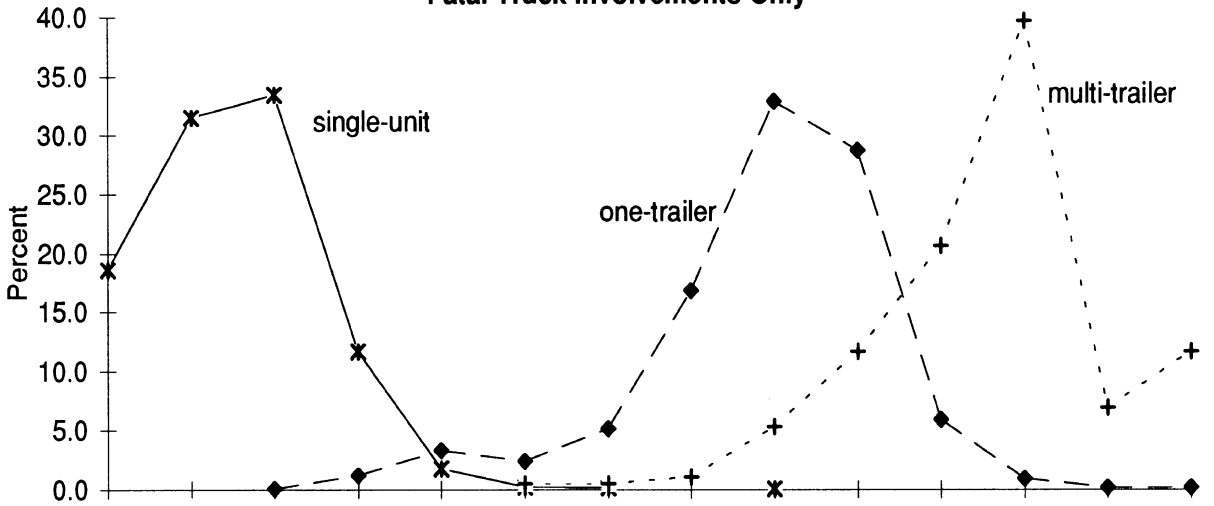


Source: 1992 TIFA

The distributions of GCW for one-trailer and multi-trailer trucks involved in fatal accidents show that generally the trucks were fully loaded or near-empty at the time of the accident. The distribution for one-trailer trucks shows one peak in the 20-40,000 pound range; multi-trailer trucks show a peak at 30-40,000 pounds. Both distributions had a second peak at 70-80,000 pounds. The peaks at the lighter GCWs are near the empty or unloaded weight for each configuration. A typical empty weight for a tractor-semitrailer (the most common one-trailer combination) is 20-25,000 pounds. For a multi-trailer combination, a typical empty weight is in the 30-35,000 pound range. Trucks in the second peak were at or near the legal GCW limit. Federal law caps GCW at 80,000 pounds, though greater weights are possible with special permits or other exemptions. Note that a much greater proportion of multi-trailer combinations than one-trailer or single-unit trucks fell into the over-80,000 pound category.

Figure IV-4 shows the distribution of overall length for trucks involved in fatal accidents in 1992. Nearly all single-unit trucks in fatal accidents were shorter than 36 feet and most were shorter than the shortest one-trailer trucks. One-trailer combinations less than 46 feet long are primarily straight trucks pulling a short trailer. Most one-trailer combinations were in the 56-65 foot range, while about 40% of multi-trailer combinations were 71-75 feet long. Ninety percent of one-trailer trucks in fatal accidents were between 46 and 70 feet long. Almost 80% of multi-trailer trucks were between 61 and 80 feet long. The increase for the over-80 foot category in the multi-trailer combinations reflects several cases of extreme overall lengths. These vehicles were either triple trailers or some other type of longer combination vehicle (LCV). See Chapter VI, "Special Focus: Longer Combination Vehicles."

Figure IV-4 Overall Length by Truck Configuration
Fatal Truck Involvements Only



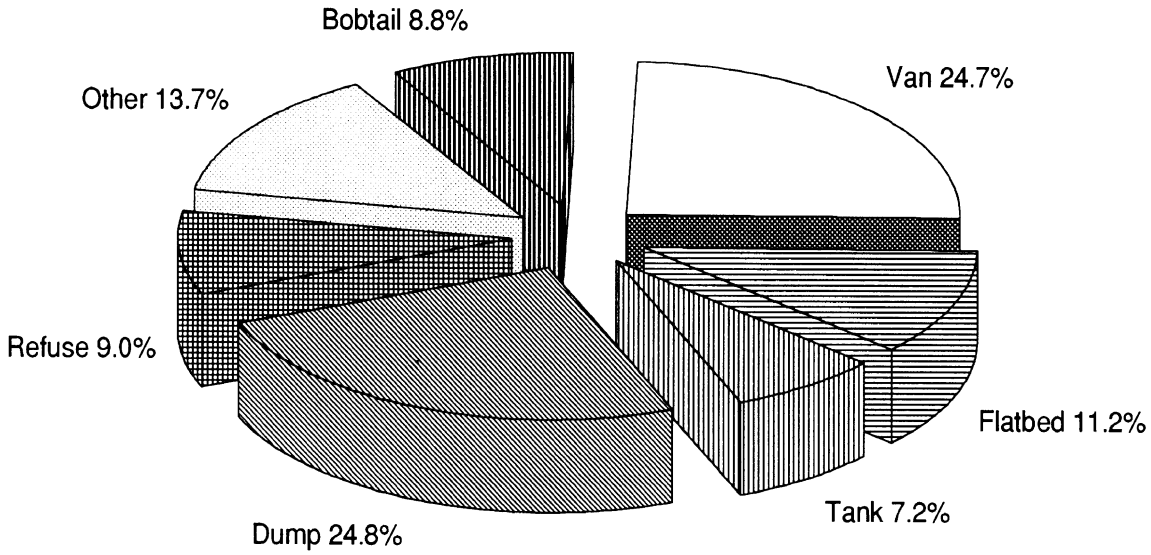
Source: 1992 TIFA

Cargo body and cargo

Figures IV-5, IV-6, and IV-7 show the distribution of cargo body type for single-unit, one-trailer, and multi-trailer trucks involved in fatal accidents in 1992. The distribution of cargo body styles was different for each truck type. Almost 9%, 110 out of 1,257, of single-unit trucks were "bobtails," tractors without a trailer. Vans and dumps each accounted for about one quarter of the single-unit trucks. Nine percent were refuse trucks, 7.2% were tanks, 11.2% were flatbeds, and 13.7% had some "other" cargo body style. The "other" cargo body type consisted primarily of specialized trucks such as utility trucks or vehicles with cranes, booms, and similar equipment.

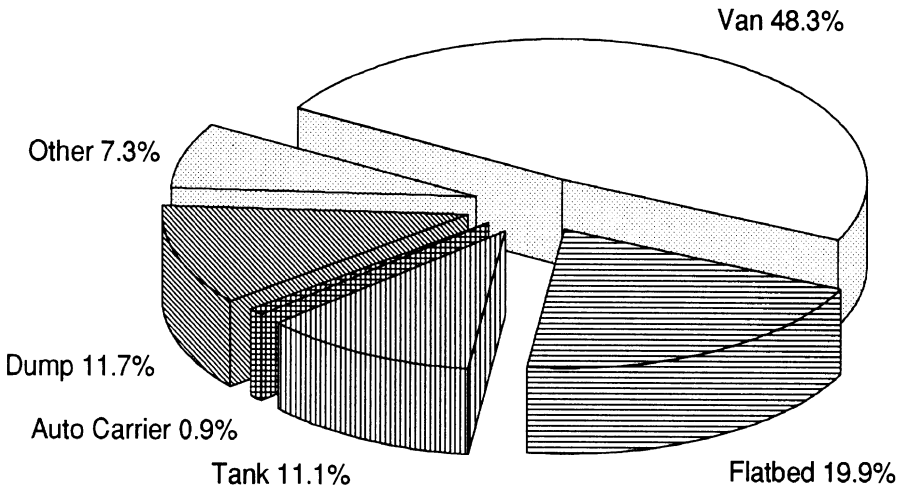
One- and multi-trailer trucks had a higher proportion of van and flatbed bodies than did single-unit trucks. Forty-eight point three percent of one-trailer trucks had a van trailer, and 56.6% of multi-trailer trucks were vans. Almost 20% of one-trailer trucks were flatbeds, while 24.3% of multi-trailer trucks were flatbeds. Though these are distributions of trucks in fatal accidents, they clearly reflect the typical usage of each truck type. One- and multi-trailer trucks are most often employed to haul large quantities of general freight long distances. Single-unit trucks are used for a variety of tasks in urban and farming communities.

Figure IV-5 Cargo Body Type for Single-Unit Trucks
Fatal Truck Involvements Only



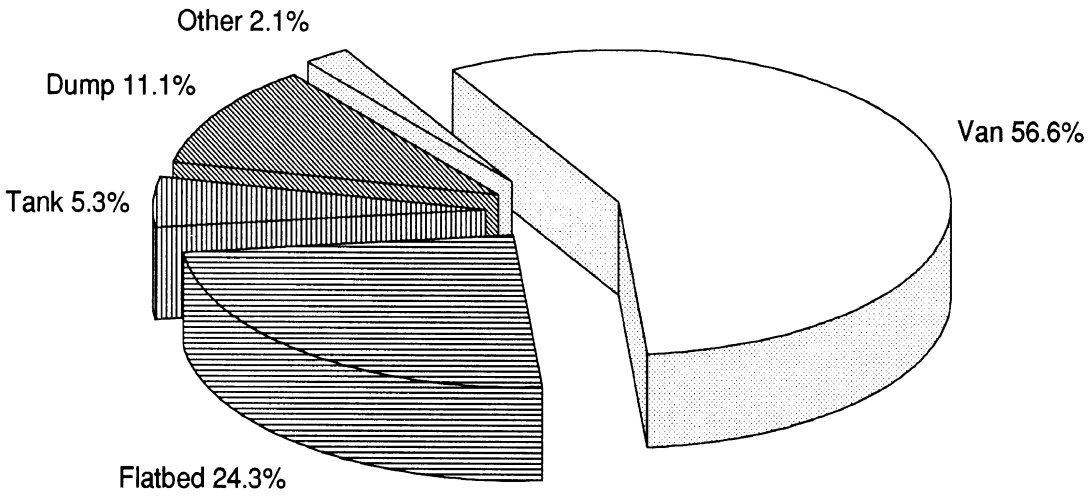
Source: 1992 TIFA

Figure IV-6 Cargo Body Type for One-Trailer Trucks
Fatal Truck Involvements Only



Source: 1992 TIFA

Figure IV-7 Cargo Body Type for Multi-Trailer Trucks
Fatal Truck Involvements Only



Source: 1992 TIFA

The most common cargo carried by single-unit trucks involved in a fatal accident was solids in bulk with 21.9% (table IV-4). This is consistent with their relatively high proportion of dump cargo bodies (figure IV-5). Single-unit trucks were empty one-third of the time and carried general freight in 10.3% of their fatal involvements. General freight was the most frequent cargo of one-trailer trucks involved in a fatal accident (24.8%), followed by solids in bulk (10.9%) and refrigerated food (8.1%). Multi-trailer trucks carried general freight in almost half of their fatal involvements, 47.6%. Other common cargoes for multi-trailer trucks were solids in bulk (7.4%), large objects (6.9%), and farm products (5.8%). Though fewer in number than the other configurations, the proportion of multi-trailer trucks in fatal accidents that carried farm products was over twice as high as for single-unit trucks and over three times greater than one-trailer trucks. In several Western States, transporting agricultural commodities is a common use of double-trailer trucks.

Table IV-4 Cargo Type by Truck Configuration
Fatal Truck Involvements Only

	Single-Unit		One-Trailer		Multi-Trailer		Unknown		All	
Cargo type	N	%	N	%	N	%	N	%	N	%
Empty	419	33.3	729	27.4	41	21.7	0	0.0	1,189	28.4
General freight	129	10.3	660	24.8	90	47.6	0	0.0	879	21.0
Household goods	19	1.5	24	0.9	0	0.0	0	0.0	43	1.0
Building materials	22	1.8	53	2.0	0	0.0	0	0.0	75	1.8
Metal	7	0.6	124	4.7	4	2.1	0	0.0	135	3.2
Heavy machinery	6	0.5	53	2.0	0	0.0	0	0.0	59	1.4
Large objects	26	2.1	52	2.0	13	6.9	0	0.0	91	2.2
Motor vehicles	1	0.1	25	0.9	0	0.0	0	0.0	26	0.6
Piggyback/towaway	16	1.3	0	0.0	0	0.0	0	0.0	16	0.4
Gases in bulk	16	1.3	5	0.2	1	0.5	0	0.0	22	0.5
Solids in bulk	275	21.9	290	10.9	14	7.4	0	0.0	579	13.8
Liquids in bulk	52	4.1	145	5.5	4	2.1	0	0.0	201	4.8
Explosives	0	0.0	2	0.1	0	0.0	0	0.0	2	0.0
Lumber	9	0.7	145	5.5	3	1.6	0	0.0	157	3.8
Refrigerated food	46	3.7	216	8.1	3	1.6	0	0.0	265	6.3
Mobile home	0	0.0	4	0.2	0	0.0	0	0.0	4	0.1
Farm products	31	2.5	48	1.8	11	5.8	0	0.0	90	2.2
Live animals	3	0.2	13	0.5	2	1.1	0	0.0	18	0.4
Other	61	4.9	21	0.8	0	0.0	0	0.0	82	2.0
N/A (bobtail)	101	8.0	0	0.0	0	0.0	0	0.0	101	2.4
Unknown	18	1.4	51	1.9	3	1.6	79	100.0	151	3.6
Total	1,257	100.0	2,660	100.0	189	100.0	79	100.0	4,185	100.0

Source: 1992 TIFA

Jackknife, rollover, and fire

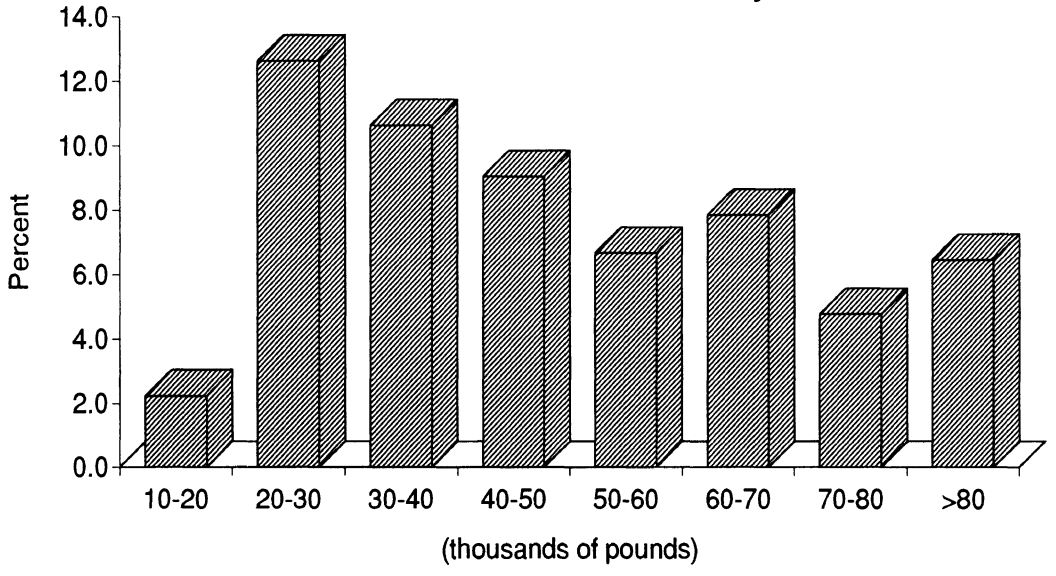
Jackknife occurs when a trailer rotates with respect to the unit pulling it, often so far that the trailer and tractor make contact. Overall, jackknife occurred in an estimated 7.3% of all combination trucks involved in an accident (table IV-5). The proportion of jackknifed trucks was about the same in fatal and towaway accidents, 8.4% and 9.8% respectively, but only 3.6% for injury accidents. Jackknife occurs most often when the brakes on the rear axles of a tractor "lock" during sudden braking. Brake lock is more likely if the trailer is unloaded or lightly loaded. Figure IV-8 illustrates that jackknife is related to GCW. Over 12% of one-trailer trucks weighing 20-30,000 pounds jackknifed, compared with about 5% of one-trailer trucks weighing 70-80,000 pounds.

Table IV-5 Jackknife by Accident Severity (trucks with trailers only)

Jackknife	Fatal	Injury	Towaway	All
		(frequency)		
No	2,612	28,000	37,000	67,000
Yes	239	1,000	4,000	5,000
Total	2,851	29,000	41,000	72,000
		(row percent)		
No	3.9	41.1	55.0	100.0
Yes	4.5	19.6	75.9	100.0
Total	3.9	39.5	56.5	100.0
		(column percent)		
No	91.6	96.4	90.2	92.7
Yes	8.4	3.6	9.8	7.3
Total	100.0	100.0	100.0	100.0

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure IV-8 Percentage of One-Trailer Trucks Jackknifing by Total Weight Fatal Truck Involvements Only



Sources: 1992 TIFA, 1992 GES, 1992 FARS

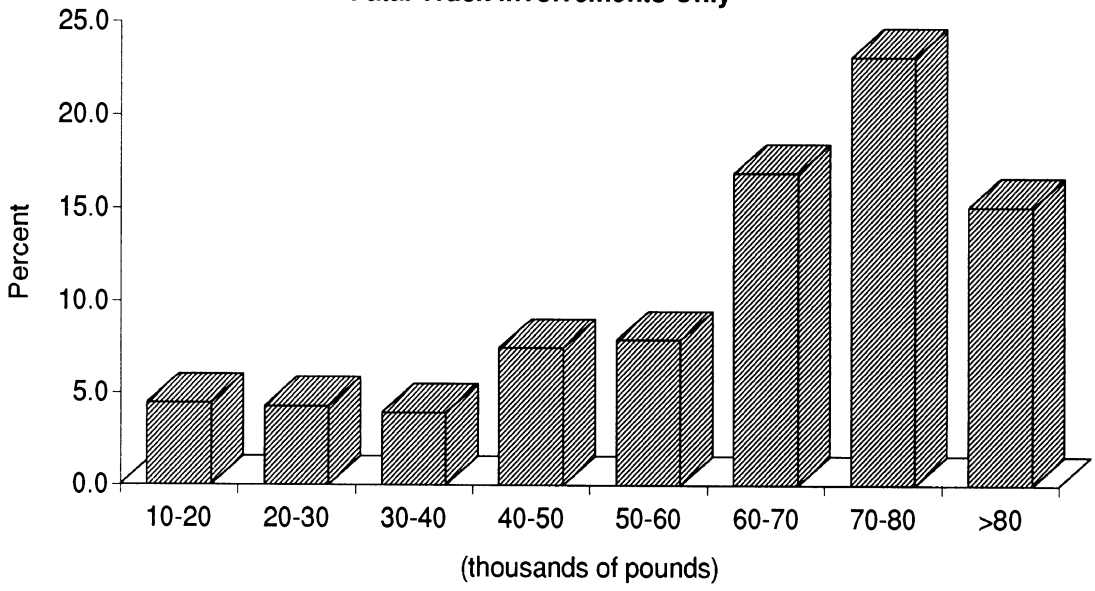
Rollover is associated with more serious accidents. Almost 13.6% of trucks involved in a fatal accident rolled over (table IV-6). The proportion drops to 4.5% for injury accidents and 3.4% for towaways. Similarly, 9.9% of rollover involvements included a fatality, compared with only 2.8% of non-rollover involvements. Rollover is also related to GCW, though the relationship is the inverse of that in jackknife. Loaded vehicles tend to roll over more frequently than unloaded vehicles, because the center of gravity of a loaded vehicle is higher than when unloaded. Only 4.3% of one-trailer trucks weighing 20-30,000 pounds rolled over, compared with 23.1% of one-trailer trucks with a GCW of 70-80,000 pounds (figure IV-9).

Table IV-6 Rollover by Accident Severity

Rollover	Fatal	Injury	Towaway	All
		(frequency)		
No	3,617	52,000	72,000	128,000
Yes	568	3,000	3,000	6,000
Unknown	0	2,000	4,000	6,000
Total	4,185	57,000	78,000	139,000
		(row percent)		
No	2.8	41.1	56.1	100.0
Yes	9.9	44.4	45.7	100.0
Unknown	0.0	36.4	63.6	100.0
Total	3.0	41.0	56.0	100.0
		(column percent)		
No	86.4	91.7	91.7	91.6
Yes	13.6	4.5	3.4	4.1
Unknown	0.0	3.8	4.9	4.3
Total	100.0	100.0	100.0	100.0

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure IV-9 Percentage of One-Trailer Trucks Rolling Over by Total Weight
Fatal Truck Involvements Only



Sources: 1992 TIFA, 1992 GES, 1992 FARS

Considering accidents of all severities, the occurrence of a fire on the truck is a rare event (table IV-7). An accident-involved truck experienced a fire less that one percent of the time in 1992. Fire is associated with the more serious accidents. Of the trucks that experienced a fire, 16.5% were involved in fatal accidents and 60.6% in injury accidents. Where there was no fire, 2.9% were involved in a fatal accident and 40.9% in injury accidents.

Table IV-7 Truck Fire by Accident Severity

Fire	Fatal	Injury	Towaway	All
(frequency)				
No	4,029	57,000	78,000	138,000
Yes	156	1,000	*	1,000
Total	4,185	57,000	78,000	139,000
(row percent)				
No	2.9	40.9	56.2	100.0
Yes	16.5	60.6	22.9	100.0
Total	3.0	41.0	56.0	100.0
(column percent)				
No	96.3	99.0	99.7	99.3
Yes	3.7	1.0	0.3	0.7
Total	100.0	100.0	100.0	100.0

* GES estimate < 500

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Hazardous materials

Of the 4,185 trucks involved in a fatal accident in 1992, 202 (4.8%) were transporting hazardous commodities (table IV-8). Tanks were the most common cargo body type among these involvements, accounting for 62.4% (126) of the 202 trucks involved. Vans were the second-most common cargo body, with 50 vehicles. Hazardous commodities in vans are typically packaged goods, such as drums of paint or chemicals. In tanks, the most common hazardous material is gasoline.

Table IV-8 Trucks Transporting Hazardous Materials
Cargo Body Type by Truck Configuration
Fatal Truck Involvements Only

Cargo	Single-Unit		One-Trailer		Multi-Trailer		All	
body	N	%	N	%	N	%	N	%
Van	10	16.1	30	23.6	10	76.9	50	24.8
Flatbed	6	9.7	7	5.5	0	0.0	13	6.4
Tank	40	64.5	83	65.4	3	23.1	126	62.4
Dump	0	0.0	2	1.6	0	0.0	2	1.0
Refuse	0	0.0	1	0.8	0	0.0	1	0.5
Other	6	9.7	4	3.1	0	0.0	10	5.0
Total	62	100.0	127	100.0	13	100.0	202	100.0

Source: 1992 TIFA

There was a total of 30 hazardous materials spills as a consequence of fatal truck accidents in 1992 (table IV-9). Spillage of cargo was more likely from single-unit trucks than from either one-trailer or multi-trailer trucks. Almost 36% of single-unit trucks transporting hazardous materials in a fatal accident spilled some of their cargo, compared with 6.3% of one-trailer trucks and no spills for multi-trailer trucks.

Table IV-9 Trucks Transporting Hazardous Materials
Cargo Spillage by Truck Configuration
Fatal Truck Involvements Only

Cargo	Single-Unit		One-Trailer		Multi-Trailer		All	
spillage	N	%	N	%	N	%	N	%
Yes	22	35.5	8	6.3	0	0.0	30	14.9
No	40	64.5	119	93.7	13	100.0	172	85.1
Total	62	100.0	127	100.0	13	100.0	202	100.0

Source: 1992 TIFA

V. Drivers: Trucks

This section presents statistics on the drivers of trucks involved in traffic accidents in the United States in 1992. Highlights of this section:

- 133,000 truck drivers were involved in traffic accidents in 1992
- 521 truck drivers died in traffic accidents
- While all accident-involved truck drivers had a lower probability of non-fatal injury than all accident-involved passenger car drivers (whether involved in a collision with a truck or not), the probability of fatal injury was the same for each: 0.4%
- 1.3% of truck drivers had been using alcohol, compared with 5.6% of passenger car drivers
- 18.0% of the drivers of single-unit trucks in accidents were under 25 years old, compared with 6.7% of one-trailer truck drivers and 5.1% of multi-trailer truck drivers
- The probability of injury to the truck driver was significantly higher in head-on and single-vehicle accidents than for other collision types
- Rollover and ejection are both strongly associated with fatal and other serious injuries

Note: The estimated number of drivers involved in traffic accidents is lower than the estimated number of trucks because some trucks were driverless at the time of the accident. This can occur when the truck is stopped on or partially on the road, e.g., due to mechanical problems or for some other reason, and the driver is away from the truck.

All figures for driver fatalities are taken from the TIFA or FARS files. Estimates based solely or in part on the GES file are rounded to the nearest thousand.

Driver injury

Of the 133,000 truck drivers involved in traffic accidents in 1992, an estimated 11,000 received C injuries, 8,000 sustained B injuries, 4,000 suffered A injuries, and 521 were killed (table V-1). 'A' injuries are incapacitating, though not fatal; B injuries are evident, e.g., a laceration, but not incapacitating; C injuries involve a complaint of pain but are not evident to observers at the scene of the accident. (See *injury severity* in the Glossary for an explanation of injury severity classifications.) Truck drivers involved in traffic accidents were less likely to be injured than car drivers. Overall, 82.3% of the truck drivers were not injured, while 62.3% of passenger car drivers involved in traffic accidents were uninjured. Higher proportions of car drivers sustained injury for each injury severity level. Note however that the proportion suffering fatal injuries was the same for both passenger car and truck drivers. Given involvement in a traffic accident, 0.4% of both truck drivers and passenger car drivers were killed. (The traffic accidents reported in the table include all traffic accidents, not just truck/car collisions.)

Table V-1 Driver Injury Severity for Trucks and Passenger Cars

Injury severity	Truck drivers: truck accidents		Passenger cars drivers: all accidents	
	N	%	N	%
Fatal	521	0.4	13,000	0.4
A injury	4,000	3.1	168,000	5.5
B injury	8,000	5.9	339,000	11.1
C injury	11,000	8.3	615,000	20.2
No injury	109,000	82.3	1,898,000	62.3
Severity unknown	*	*	9,000	0.3
Died prior	2	0.0	*	*
Unknown	*	*	4,000	0.1
Total	133,000	100.0	3,046,000	100.0

* GES estimate less than 500 or less than 0.05%

Sources: 1992 TIFA, 1992 GES, 1992 FARS

A total of 4,769 people were killed in truck accidents in 1992 (table V-2). A large majority of the fatalities, 3,743 (78.5%), occurred in the other, non-truck vehicles involved, primarily passenger cars. Six hundred and two (12.6%) were truck occupants, either the driver (521) or a passenger (81). Non-motorists accounted for the remaining 424 fatalities, 8.9% of the total. Most of the non-motorists were pedestrians and 55 were bicylists.

The overrepresentation of passenger car and other non-truck occupants among the fatalities is largely due to differences in mass and vehicle design. Trucks have much greater mass than almost all other motor vehicles. Accordingly, in a collision with a truck, a smaller vehicle experiences a much larger change in velocity and therefore much more damage.

Table V-2 Road User Type of Fatalities in Truck Accidents

	N	%
Trucks:		
Driver	521	10.9
Passenger	81	1.7
Truck total	602	12.6
Non-trucks		
Drivers	2,609	54.7
Passengers	1,134	23.8
Non-truck total	3,743	78.5
Non-motorists		
In parked vehicle	14	0.3
Pedestrian	353	7.4
Bicyclist	55	1.2
Other/unknown	2	0.0
Non-motorist total	424	8.9
Total	4,769	100.0

Sources: 1992 TIFA, 1992 FARS

Driver age and sex

Almost 97% of truck drivers involved in traffic accidents were male (table V-3). Over 98% of all drivers of one-trailer trucks were males. Females drove 4.9% of the single-unit trucks involved in traffic accidents and 6.0% of multi-trailer trucks. The slightly higher representation of females among single-unit and multi-trailer trucks may be because these configurations are often used in farming and associated businesses.

Table V-3 Driver Sex by Configuration Type

	Single-Unit		One-Trailer		Multi-Trailer		Unknown		Total	
Driver sex	N	%	N	%	N	%	N	%	N	%
Male	60,000	95.1	65,000	98.5	2,000	93.7	1,000	89.6	128,000	96.7
Female	3,000	4.9	1,000	1.5	*	6.0	*	10.1	4,000	3.3
Total	63,000	100.0	66,000	100.0	2,000	100.0	1,000	100.0	133,000	100.0

* GES estimate less than 500

Note: Total includes fewer than 500 with unknown sex.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Table V-4 shows the distribution of driver age for different truck combinations in traffic accidents. The distributions for one-trailer and multi-trailer trucks are very similar (see figure V-1). For both configurations, over 90% of the drivers were between 25 and 64 years of age. An estimated 6.7% of one-trailer truck drivers were under 25 and only 5.1% of multi-trailer truck drivers were under 25. Most young accident-involved truck drivers were driving single-unit trucks (11,000 of 16,000). An estimated 18.0% of single-unit drivers were under 25.

Table V-4 Driver Age by Configuration Type

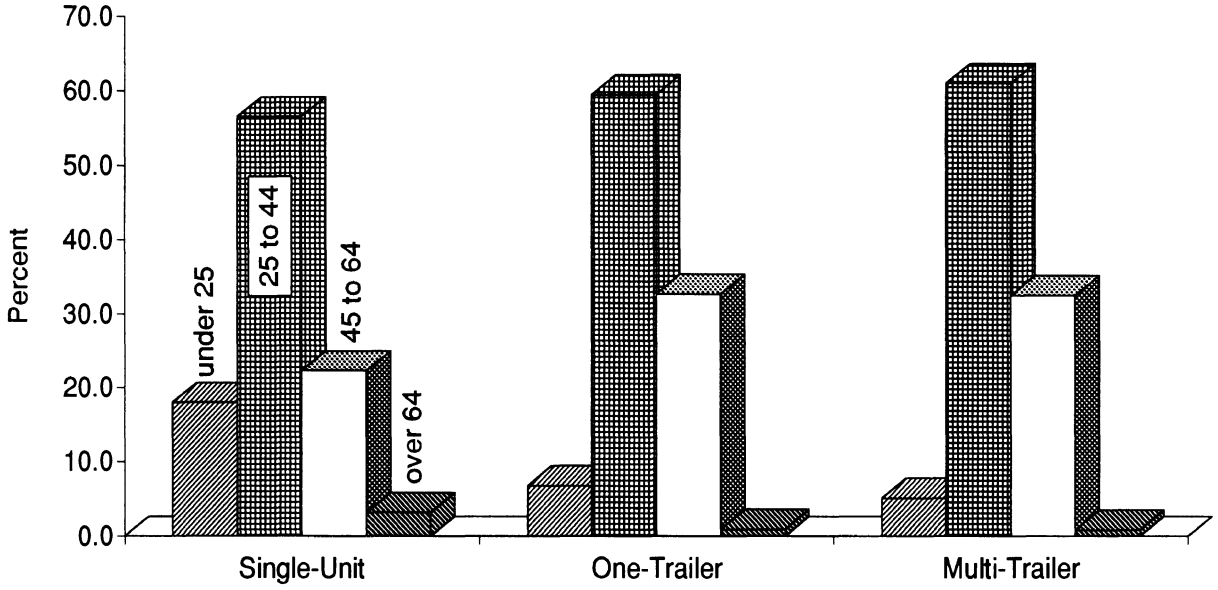
	Single-Unit		One-Trailer		Multi-Trailer		Unknown		Total	
Driver age	N	%	N	%	N	%	N	%	N	%
under 25	11,000	18.0	4,000	6.7	*	5.1	*	13.6	16,000	12.1
25 to 44	36,000	56.5	39,000	59.6	2,000	61.2	1,000	58.4	77,000	58.2
45 to 64	14,000	22.3	22,000	32.7	1,000	32.6	*	25.6	37,000	27.7
over 64	2,000	3.1	1,000	0.9	*	0.8	*	2.1	3,000	2.0
Total	63,000	100.0	66,000	100.0	2,000	100.0	1,000	100.0	133,000	100.0

* GES estimate less than 500

Note: Total includes fewer than 500 with unknown sex.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure V-1 Driver Age by Configuration Type



Sources: 1992 TIFA, 1992 GES, 1992 FARS

Configuration type

Table V-5 shows the distribution of driver injuries by configuration type for drivers involved in traffic accidents in 1992. Overall, the distributions are similar, with over 80% of the drivers uninjured in each configuration type. The proportion of multi-trailer drivers fatally injured is higher than the other two configurations, though the number of multi-trailer drivers who were killed is much smaller than for the other two. Three hundred and three drivers of one-trailer trucks were killed in traffic accidents in 1992, compared with 173 single-unit drivers, and 36 multi-trailer drivers.

Table V-5 Driver Injury Severity by Configuration Type

Injury	Single-Unit		One-Trailer		Multi-Trailer		Unknown		Total	
severity	N	%	N	%	N	%	N	%	N	%
Fatal	173	0.3	303	0.5	36	1.4	9	0.7	521	0.4
A injury	2,000	2.8	2,000	3.3	*	4.8	*	0.7	4,000	3.1
B injury	4,000	6.3	4,000	5.6	*	5.3	*	2.1	8,000	5.9
C injury	6,000	9.5	5,000	7.4	*	3.8	*	4.1	11,000	8.3
None	51,000	81.0	55,000	83.2	2,000	84.3	1,000	92.4	109,000	82.3
Total	63,000	100.0	66,000	100.0	2,000	100.0	1,000	100.0	133,000	100.0

* GES estimate less than 500

Note: Total includes fewer than 500 with unknown injury severity.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Alcohol use

Table V-6 shows alcohol use as reported by the police for drivers of trucks involved in traffic accidents in 1992. Overall, police-reported alcohol use was low for truck drivers, at 1.3%. The rates are low for all configurations, though higher for drivers of single-unit trucks (2.4%) than one-trailer or multi-trailer combinations (0.4% each).

Reported alcohol use for drivers of passenger cars was significantly higher (table V-7). Alcohol use was reported for 5.6% of passenger car drivers involved in an accident, a proportion that is over four times higher than for truck drivers. One difference between truck and car drivers is that trucks are typically used for work and business purposes, while passenger cars are used more often for recreation, where alcohol consumption is more likely.

The reader is cautioned that the rates reported here are for alcohol use as recorded by the reporting police officer. Many researchers believe that actual rates of alcohol use are higher. However, even if true alcohol use rates are higher, the ratio between truck and passenger car driver use rates would likely remain roughly the same.

Table V-6 Driver Alcohol Use by Configuration Type

Alcohol use	Single-Unit		One-Trailer		Multi-Trailer		Unknown		Total	
	N	%	N	%	N	%	N	%	N	%
No	61,000	97.1	65,000	98.6	2,000	97.4	1,000	99.5	130,000	97.9
Yes	2,000	2.4	*	0.4	*	0.4	*	0.2	2,000	1.3
Not reporte	*	0.3	*	0.7	*	1.2	*	0.2	1,000	0.5
Total	63,000	100.0	66,000	100.0	2,000	100.0	1,000	100.0	133,000	100.0

* GES estimate less than 500

Note: Total includes fewer than 500 drivers with unknown alcohol use.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Table V-7 Driver Alcohol Use for Passenger Cars

Alcohol use	Passenger car	
	N	%
No	2,872,000	94.3
Yes	170,000	5.6
Total	3,046,000	100.0

Note: Includes fewer than 500 cases where alcohol use was unreported.

Source: 1992 GES

Manner of collision and first harmful event

Table V-8 and figure V-2 show driver injury severity by the manner of collision. (The figure omits the "no injury" category to better show detail among injury types.) Rearend, angle, and sideswipe collisions produced the fewest injuries to truck drivers. For each of those collision types, almost 90% of involved truck drivers escaped with no injury at all. Head-on collisions and single-vehicle accidents, in contrast, produced much higher rates of driver injury. Single-vehicle accidents were clearly the most serious accident type for truck drivers. Three hundred and fifty-nine drivers were killed in single-vehicle truck accidents, accounting for almost 70% of the truck drivers who were killed in traffic accidents 1992. An additional estimated 3,000 drivers received A injuries and 4,000 received B injuries.

Table V-8 Driver Injury Severity by Manner of Collision

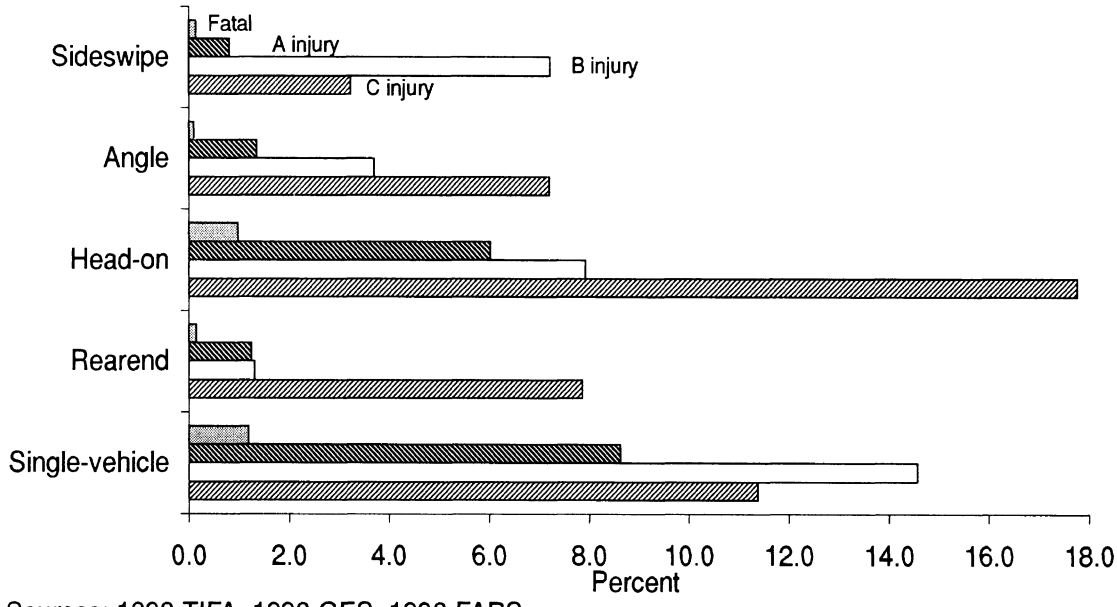
Injury	Non-collision		Collision											
	Single-vehicle		Rearend		Head-on		Angle		Sideswipe		Other/unknown		Total	
severity	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Fatal	359	1.2	55	0.1	43	1.0	47	0.1	17	0.1	0	0.0	521	0.4
A injury	3,000	8.6	*	1.2	*	6.0	1,000	1.4	*	0.8	*	0.9	4,000	3.1
B injury	4,000	14.6	*	1.3	*	7.9	2,000	3.7	1,000	7.2	*	0.3	8,000	5.9
C injury	3,000	11.4	3,000	7.9	1,000	17.8	3,000	7.2	*	3.2	*	*	11,000	8.3
No injury	19,000	64.1	33,000	89.4	3,000	67.1	42,000	87.6	11,000	88.6	1,000	97.4	109,000	82.3
Total	30,000	100.0	37,000	100.0	4,000	100.0	48,000	100.0	12,000	100.0	1,000	100.0	133,000	100.0

* GES estimate less than 500 or less than 0.05%

Note: Total includes fewer than 500 drivers with unknown injury severity.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure V-2 Driver Injury by Manner of Collision



Sources: 1992 TIFA, 1992 GES, 1992 FARS

Table V-9 and figure V-3 show driver injury by the first harmful event in the traffic accident. (The figure omits the "no injury" category to better show detail among injury types.) Most driver fatalities and serious injuries were associated with rollover, collisions with fixed objects, and collisions with other motor vehicles. Where the collision was with another motor vehicle, table V-8 showed that most serious driver injuries occurred in head-on and rearend collisions. Rollover and collisions with fixed and non-fixed objects, which are frequently single-vehicle accidents, were the most serious first harmful events in terms of both the number and the proportion of drivers injured or killed. Where the first harmful event was rollover, a total of 10% of drivers were either killed or received A injuries. Only about 50% of such drivers were uninjured, compared with 82.3% uninjured for all accident-involved truck drivers in 1992. Where the first harmful event was a collision with a fixed object such as a guardrail or utility pole, 14% received fatal or A injuries.

Table V-9 Driver Injury by First Harmful Event

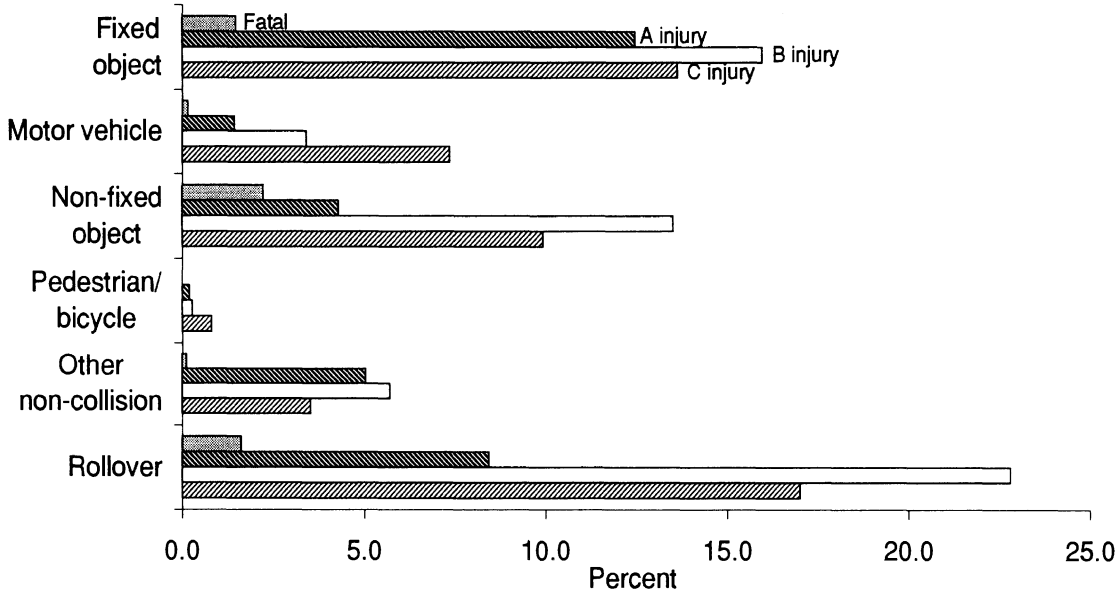
	Non-collision				Collision with:									
Injury	Rollover		Other		Motor vehicle		Pedestrian/bike		Non-fixed object		Fixed object		Total	
severity	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Fatal	125	1.6	8	0.1	162	0.2	0	0.0	47	2.2	179	1.5	521	0.4
A injury	1,000	8.4	*	5.0	1,000	1.4	*	0.2	*	4.3	2,000	12.5	4,000	3.1
B injury	2,000	22.8	*	5.7	4,000	3.4	*	0.3	*	13.5	2,000	16.0	8,000	5.9
C injury	1,000	17.0	*	3.5	8,000	7.4	*	0.8	*	9.9	2,000	13.6	11,000	8.3
No injury	4,000	50.1	6,000	85.6	90,000	87.6	1,000	98.5	1,000	70.0	7,000	56.1	109,000	82.3
Total	8,000	100.0	6,000	100.0	103,000	100.0	1,000	100.0	2,000	100.0	12,000	100.0	133,000	100.0

* GES estimate less than 500

Note: Total includes fewer than 500 drivers with unknown injury severity.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure V-3 Driver Injury by First Harmful Event



Sources: 1992 TIFA, 1992 GES, 1992 FARS

Restraint use

Table V-10 shows restraint use by driver injury. The top section of the table tabulates estimated frequencies, the middle section shows the distribution of restraint use for each injury severity, and the bottom section reports the injury distribution for each restraint use. Over 56% (293 of 521) of truck drivers killed in traffic accidents used no restraints, while only 21.9% were belted. In contrast, 34.3% of drivers who sustained no injuries used 3 point safety belts, and an additional 34.8% used either a lap belt alone or a shoulder belt alone, for a total of 69.1% using some sort of safety belt. Similarly, 71.0% of truck drivers sustaining only C injuries used some sort of safety belt restraint. The reader is cautioned, however, that safety belt use for all but the most seriously injured is primarily self-reported, since the occupants are typically out of the vehicles by the time the police arrive. Consequently, the amount of safety belt use by the uninjured and lightly injured may be exaggerated. Note also the high proportion of cases, 15.8% overall, for which restraint use is unknown.

Table V-10 Driver Injury Severity by Restraint Use

Injury severity	None	3 point belt	Other	Unknown	Total
		(frequencies)			
Fatal	293	52	62	114	521
A injury	1,000	1,000	1,000	1,000	4,000
B injury	2,000	1,000	3,000	1,000	8,000
C injury	3,000	3,000	4,000	*	11,000
None	15,000	38,000	38,000	19,000	109,000
Total	21,000	44,000	47,000	21,000	133,000
		(row percents)			
Fatal	56.2	10.0	11.9	21.9	100.0
A injury	27.1	31.7	28.3	12.8	100.0
B injury	25.3	16.6	43.2	14.9	100.0
C injury	24.8	31.3	39.7	4.3	100.0
None	13.8	34.3	34.8	17.0	100.0
Total	16.0	32.8	35.4	15.8	100.0
		(column percents)			
Fatal	1.4	0.1	0.1	0.5	0.4
A injury	5.2	3.0	2.5	2.5	3.1
B injury	9.4	3.0	7.2	5.6	5.9
C injury	12.8	7.9	9.3	2.3	8.3
None	71.2	86.0	80.9	88.8	82.3
Total	100.0	100.0	100.0	100.0	100.0

* GES estimate less than 500

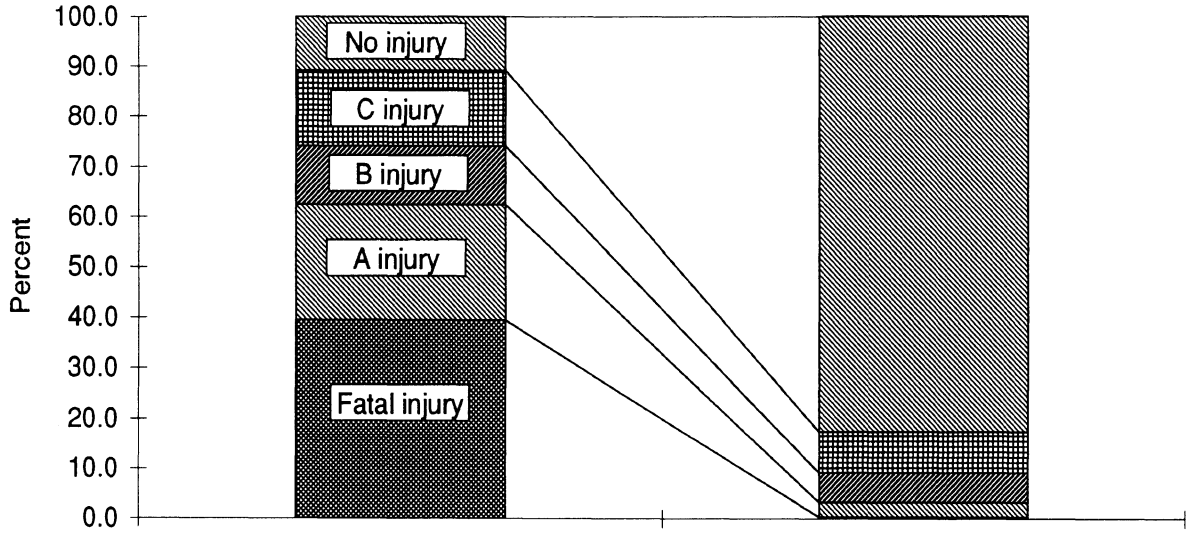
Note: Total includes fewer than 500 drivers with unknown injury severity.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Ejection and rollover

Ejection is strongly associated with serious driver injuries. There were fewer than an estimated 500 ejections of truck drivers in traffic accidents in 1992. Nevertheless, the probability of serious injury is high when ejection occurs. Figure V-4 shows the injury distribution for ejection and no ejection. Almost 40% of ejected drivers were killed, and an additional 22.9% sustained A injuries. Among drivers who stayed in the cab, only 0.3% were killed and 3.0% sustained A injuries.

Figure V-4 Driver Injury by Ejection



Sources: 1992 TIFA, 1992 GES, 1992 FARS

Table V-9 tabulated rollover when it was the first harmful event. Table V-11 shows all rollovers, regardless of when the rollover occurred in the accident sequence. Rollover is associated with serious driver injuries, though not as strongly as ejection. An estimated 12,000 drivers were involved in a rollover. Of these, 306 (2.6%) were killed and an estimated 1,000 (12.5%) received A injuries. Only 44.7% of the drivers were uninjured. In contrast, 85.9% of the drivers of trucks that did not rollover were uninjured. Rollovers occurred for only 9% of all accident-involved truck drivers, but about 60% of driver fatalities and 25% of drivers with A injuries. Figure V-5 illustrates the injury distributions for trucks that rolled over and those that remained on their wheels.

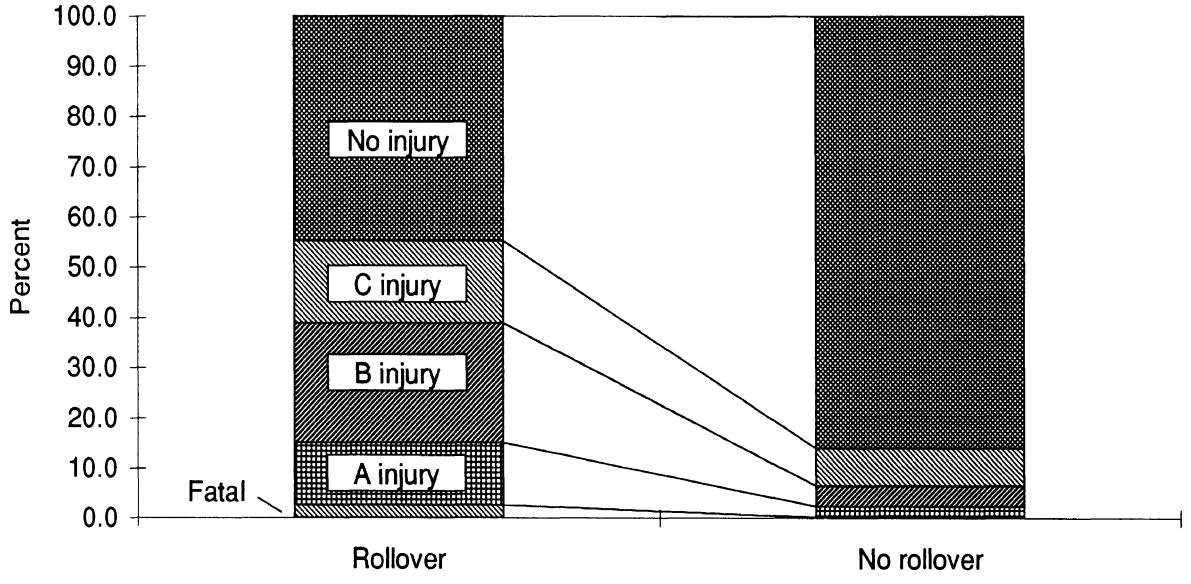
Table V-11 Driver Injury by Rollover

Injury	Rollover		No rollover		Total	
severity	N	%	N	%	N	%
Fatal	306	2.6	215	0.2	521	0.4
A injury	1,000	12.5	3,000	2.1	4,000	3.1
B injury	3,000	23.8	5,000	4.2	8,000	5.9
C injury	2,000	16.3	9,000	7.5	11,000	8.3
None	5,000	44.7	104,000	85.9	109,000	82.3
Total	12,000	100.0	121,000	100.0	133,000	100.0

Note: Total includes fewer than 500 drivers with unknown injury severity.

Sources: 1992 TIFA, 1992 GES, 1992 FARS

Figure V-5 Driver Injury by Rollover



Sources: 1992 TIFA, 1992 GES, 1992 FARS

VI. Special Focus: Longer Combination Vehicles

There is no common, uniform definition of a "longer combination vehicle." Each State exercises primary responsibility for setting truck weight and length limits within its borders, consistent with Federal regulations. The Surface Transportation Assistance Act of 1982 (STAA) required States to permit trucks with two trailers, each 28.5 feet long, on Interstate highways and other routes designated by the States. In addition, the Act prohibited States from establishing a maximum gross combination weight (GCW) limit of less than 80,000 pounds. In 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) froze State weight and length limits by providing that no State could permit multi-trailer trucks longer or heavier than those operating under existing State laws as of June 1, 1991. Accordingly, in this section, a "longer combination vehicle" is defined as a combination vehicle that exceeds the minimum weight and length standards set by the STAA of 1982. An LCV, therefore, is:

- a truck-tractor with at least two trailers capable of carrying cargo;
- and at least one trailer 29 feet long or longer;

or,

- a truck-tractor with at least two trailers capable of carrying cargo;
- and a gross combination weight greater than 80,000 pounds;

or,

- a truck-tractor with three trailers capable of carrying cargo.

Overlength LCVs have at least one cargo-carrying trailer longer than 28.5 feet. **Overweight** LCVs exceed the weight standard only (i.e., both trailers are within the length standard but the gross combination weight (GCW) of the vehicle exceeds 80,000 pounds). LCVs categorized as **both** exceed both the weight and length standards. Triples are LCVs with three cargo-carrying trailers. A truck-tractor, two-trailer combination that falls within the limits established by the STAA of 1982 will be termed an "**STAA double**."

Data presented in this section are drawn entirely from the Trucks Involved in Fatal Accident (TIFA) file; accordingly only LCVs involved in fatal accidents are included. Currently, only the TIFA file includes the data on individual trailer lengths and GCW necessary to identify LCVs.

Five-year trends

Table VI-1 shows the number of LCVs involved in fatal accidents, 1988-1992. Also shown for comparison is the number of "STAA doubles" and doubles combinations for which weight or trailer-length information is not available to make a classification. The "grand total" for the table includes all tractors with multiple trailers and the proportions calculated are of all tractors with multiple trailers (doubles and triples). After the 1988 data year, the number of "unknown doubles" declined dramatically because of an increased effort in TIFA to determine all trailer lengths.

Table VI-1 Fatal Involvements of LCVs and "STAA Doubles," 1988-1992

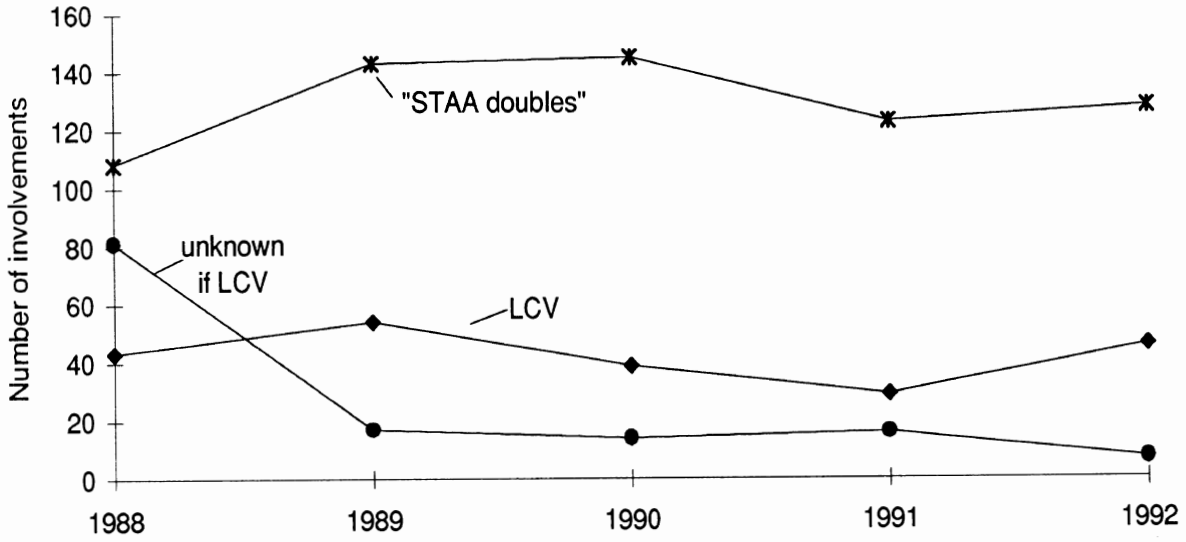
	1988		1989		1990		1991		1992	
Year	N	%	N	%	N	%	N	%	N	%
Longer Combination Vehicles										
Overlength	17	7.3	26	12.1	24	12.1	20	11.9	17	9.4
Overweight	19	8.2	10	4.7	10	5.1	2	1.2	12	6.6
Both	5	2.2	16	7.5	3	1.5	7	4.2	14	7.7
Triple	2	0.9	2	0.9	2	1.0	0	0.0	3	1.7
Subtotal	43	18.5	54	25.2	39	19.7	29	17.3	46	25.4
Non-LCV Tractor and Two Trailers										
"STAA double"	108	46.6	143	66.8	145	73.2	123	73.2	128	70.7
Unknown double	81	34.9	17	7.9	14	7.1	16	9.5	7	3.9
Grand total	232	100	214	100	198	100	168	100	181	100

Source: 1992 TIFA

The sum of all LCV types—overlength, overweight, both overweight and overlength, and triples—varied from a high of 54 in 1989 to a low of 29 in 1991. In 1992, 46 LCVs were involved in a fatal accident. Similarly, the total of "STAA doubles" and other doubles of unknown type ranged from 189 in 1988 to 135 in 1992. The number of LCVs has remained relatively constant, while the number of non-LCV doubles has declined slightly.

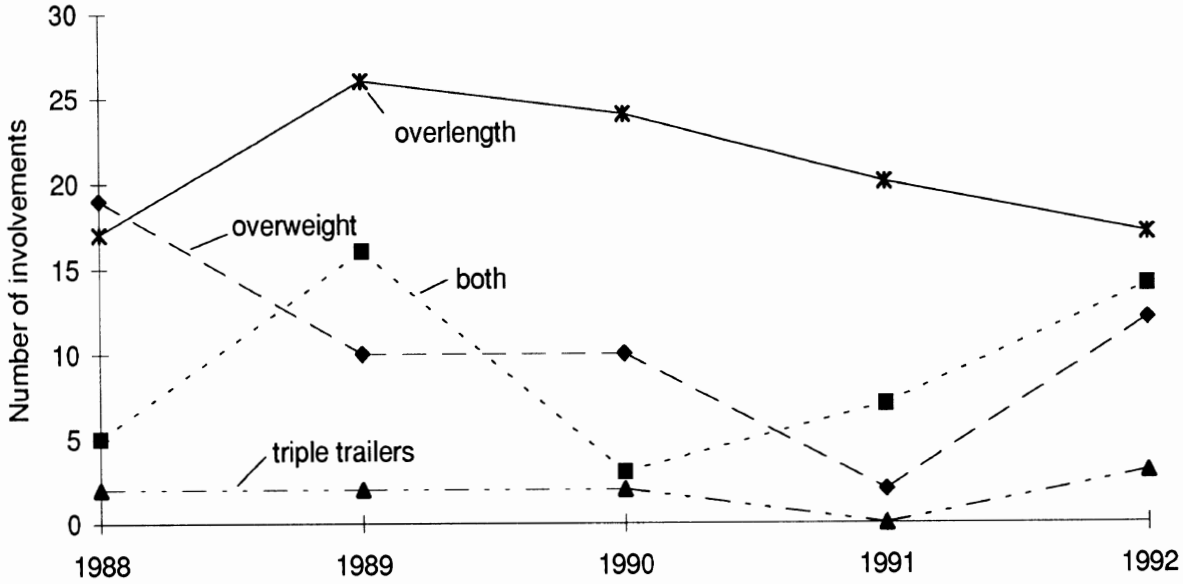
Figure VI-2 shows the detail underlying the LCV line in figure VI-1. Overlength LCVs are the most common type, triples the least common. There were two triples involved in a fatal accident in 1988, 1989, and 1990; none in 1991; and three in 1992. The number of involvements is so small that there does not appear to be any meaningful trend.

Figure VI-1 Fatal Involvements of LCV's and "STAA" Doubles, 1988-1992



Source: 1992 TIFA

Figure VI-2 Fatal Involvements of LCV Types, 1988-1992



Source: 1992 TIFA

Common LCV types

Two LCV types have common names in the trucking industry. "Turnpike doubles" consist of two trailers of the same length, each 40 to 48 feet long. "Rocky Mountain doubles" have a 40-foot first trailer and a short, typically 28-foot, second trailer. As table VI-2 shows, most LCVs do not fall into either category. The definition of "Rocky Mountain doubles" was broadened for table VI-2 to include any combination with a first trailer over 40 feet and a second trailer between 20 and 30 feet long. Even using this expanded definition, a substantial number of LCVs involved in fatal accidents in 1992 ("other LCV" in the table) did not fall into any of the "standard" types.

Table VI-2 Common LCV Types
Fatal Involvements Only

	N	%
Turnpike double	2	4.3
Rocky Mountain double	14	30.4
Other LCV	15	32.6
Overweight	12	26.1
Triple	3	6.5
Total	46	100.0

Source: 1992 TIFA

Table VI-3 compares the number of fatal involvements, fatalities, and deaths per involvement for LCVs, other tractors with two trailers, and tractor-semitrailers. There were almost 2,500 tractor-semitrailers involved in a fatal accident in 1992, with 2,835 deaths and a rate of 1.14 deaths per involvement. The death rate for all LCVs was higher, 1.33, though the high death rate for overweight LCVs accounted for the difference. The death rate for overlength LCVs was 1.18, and for triples 1.00. The reader is cautioned that, since there are so few LCV fatal involvements, one accident with a large number of deaths can skew the results.

Table VI-3 Fatal Involvements and Deaths
for Selected Combination Types

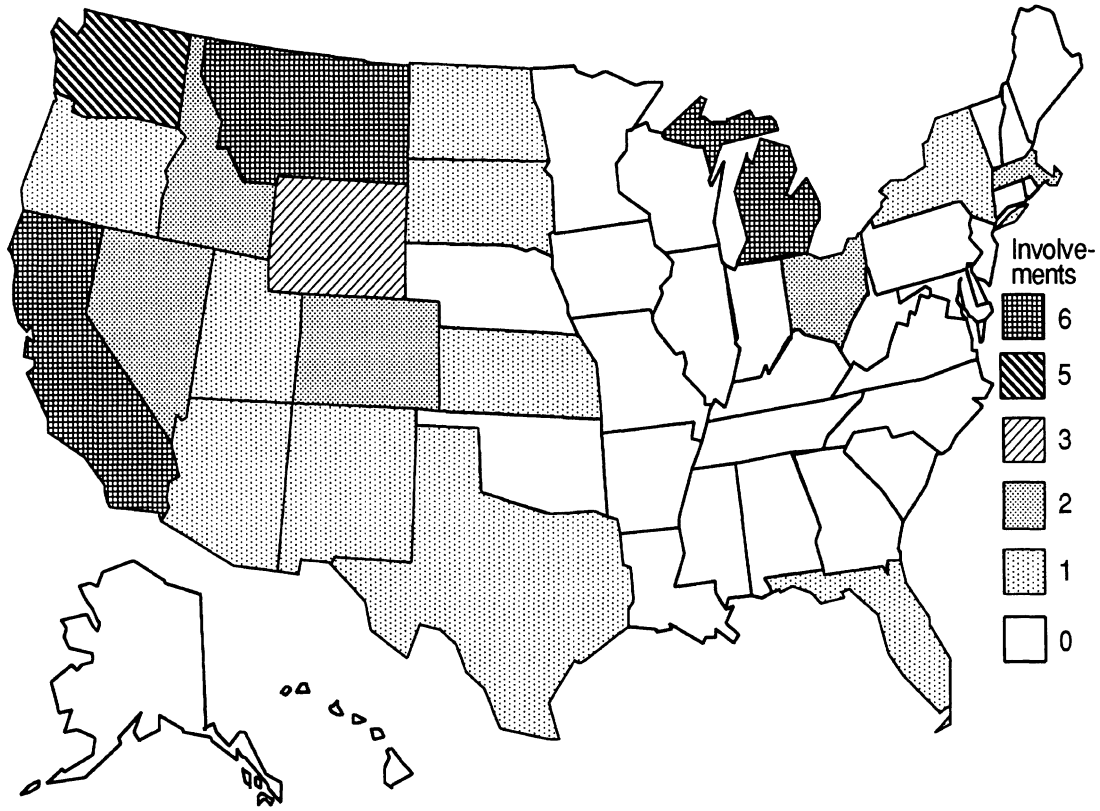
Combination type	Involvements	Total deaths	Deaths per involvement
Longer Combination Vehicles			
Overlength	17	20	1.18
Overweight	12	19	1.58
Both	14	19	1.36
Triple	3	3	1.00
Subtotal	46	61	1.33
Other tractor and two trailers			
"STAA double"	128	148	1.16
Unknown double	7	8	1.14
Subtotal	135	156	1.16
Other tractor combination			
Tractor-semitrailer	2,478	2,835	1.14

Source: 1992 TIFA

LCV fatal involvements by State

Figure VI-3 shows the distribution of LCV fatal involvements across the United States in 1992. Thirty-four of the 46 LCV involvements occurred in the 17 contiguous States west of a line drawn from the western border of Minnesota to Louisiana, though Michigan was one of the three States with six fatal involvements and Ohio and Massachusetts had two each. The Western States have historically permitted longer truck combinations than the East because of the vast distances between population centers. Michigan's weight laws allow gross combination weights (GCW) up to 164,000 pounds.

Figure VI-3 Fatal LCV Involvements by State



Source: 1992 TIFA

Table VI-4 shows the States in which fatal accidents involving LCVs occurred, broken down by LCV type. In 1992, three triple-trailer combinations were involved in fatal accidents. Nevada, Ohio, and Oregon each recorded one triples fatal involvement. Michigan had the greatest number of overweight LCV involvements with five. All LCVs involved in a fatal accident in Michigan in 1992 weighed over 80,000 pounds.

(Fatal LCV involvements are listed for some States which do not ordinarily permit LCVs. These vehicles were operating either under special permits or illegally.)

Table VI-4 State by LCV Type
Fatal Involvements Only

State	Overlength		Overweight		Both		Triple		Total	
	N	%	N	%	N	%	N	%	N	%
Arizona	0	0.0	1	8.3	0	0.0	0	0.0	1	2.2
California	4	23.5	2	16.7	0	0.0	0	0.0	6	13.0
Colorado	1	5.9	1	8.3	0	0.0	0	0.0	2	4.3
Florida	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
Idaho	1	5.9	0	0.0	1	7.1	0	0.0	2	4.3
Kansas	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Massachusetts	2	11.8	0	0.0	0	0.0	0	0.0	2	4.3
Michigan	0	0.0	5	41.7	1	7.1	0	0.0	6	13.0
Montana	2	11.8	0	0.0	4	28.6	0	0.0	6	13.0
Nevada	1	5.9	0	0.0	0	0.0	1	33.3	2	4.3
New Mexico	0	0.0	1	8.3	0	0.0	0	0.0	1	2.2
New York	0	0.0	1	8.3	0	0.0	0	0.0	1	2.2
North Dakota	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Ohio	0	0.0	1	8.3	0	0.0	1	33.3	2	4.3
Oregon	0	0.0	0	0.0	0	0.0	1	33.3	1	2.2
South Dakota	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Texas	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
Utah	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Washington	2	11.8	0	0.0	3	21.4	0	0.0	5	10.9
Wyoming	2	11.8	0	0.0	1	7.1	0	0.0	3	6.5
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

Total length

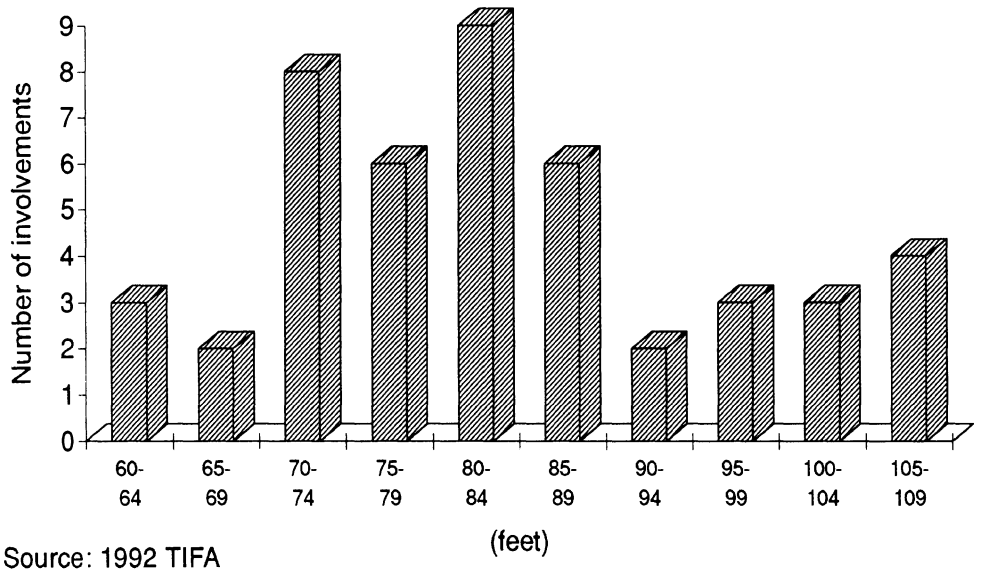
Table VI-5 tabulates total length for each type of LCV while figure VI-4 shows the distribution for all LCVs. Overall, LCVs involved in fatal accidents ranged from 60 to 107 feet long. It is possible for LCVs to qualify as "overlength" with relatively short total lengths, since trailer length is one of the criteria for an LCV while overall length is not. Three of the "overlength" LCVs were shorter than 75 feet, including one combination that was 68 feet long. Most LCVs that met the length criterion ranged from 75 to 89 feet long, while one triples combination was 99 feet long and the other two were 107 feet long.

Table VI-5 LCV Type by Total Length
Fatal Involvements Only

Length	Overlength		Overweight		Both		Triple		Total	
in feet	N	%	N	%	N	%	N	%	N	%
60-64	0	0.0	3	25.0	0	0.0	0	0.0	3	6.5
65-69	1	5.9	1	8.3	0	0.0	0	0.0	2	4.3
70-74	2	11.8	6	50.0	0	0.0	0	0.0	8	17.4
75-79	5	29.4	1	8.3	0	0.0	0	0.0	6	13.0
80-84	3	17.6	1	8.3	5	35.7	0	0.0	9	19.6
85-89	2	11.8	0	0.0	4	28.6	0	0.0	6	13.0
90-94	0	0.0	0	0.0	2	14.3	0	0.0	2	4.3
95-99	1	5.9	0	0.0	1	7.1	1	33.3	3	6.5
100-104	2	11.8	0	0.0	1	7.1	0	0.0	3	6.5
105-109	1	5.9	0	0.0	1	7.1	2	66.7	4	8.7
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

Figure VI-4 Overall Length of LCVs Involved in Fatal Accidents



Source: 1992 TIFA

Gross combination weight

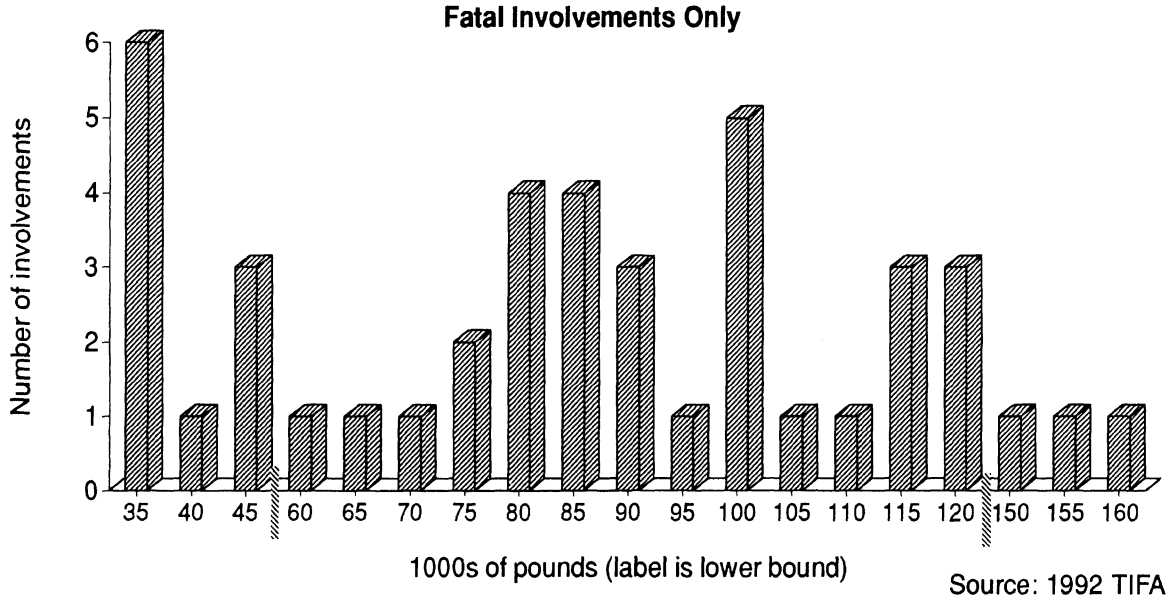
LCVs involved in fatal accidents in 1992 ranged in gross combination weight (GCW) from 35,000 pounds to 165,000 pounds (table VI-6). Twenty-eight of the 46 LCVs weighed over 80,000 pounds; 16 weighed over 100,000 pounds. Figure VI-5 shows the distribution of GCW for all LCVs. The peak at 35,000 pounds corresponds to empty or near-empty vehicles. Trucks heavier than 80,000 pounds were likely fully loaded.

Table VI-6 LCV Type by Gross Combination Weight (GCW)
Fatal Involvements Only

	Overlength		Overweight		Both		Triple		Total	
GCW	N	%	N	%	N	%	N	%	N	%
35,001-40,000	6	35.3	0	0.0	0	0.0	0	0.0	6	13.0
40,001-45,000	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
45,001-50,000	3	17.6	0	0.0	0	0.0	0	0.0	3	6.5
60,001-65,000	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
65,001-70,000	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
70,001-75,000	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
75,001-80,000	1	5.9	0	0.0	0	0.0	1	33.3	2	4.3
80,001-85,000	0	0.0	3	25.0	0	0.0	1	33.3	4	8.7
85,001-90,000	0	0.0	2	16.7	2	14.3	0	0.0	4	8.7
90,001-95,000	0	0.0	1	8.3	2	14.3	0	0.0	3	6.5
95,001-100,000	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
100,001-105,000	0	0.0	0	0.0	4	28.6	1	33.3	5	10.9
105,001-110,000	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
110,001-115,000	0	0.0	1	8.3	0	0.0	0	0.0	1	2.2
115,001-120,000	0	0.0	1	8.3	2	14.3	0	0.0	3	6.5
120,001-125,000	0	0.0	1	8.3	2	14.3	0	0.0	3	6.5
150,001-155,000	0	0.0	1	8.3	0	0.0	0	0.0	1	2.2
155,001-160,000	0	0.0	1	8.3	0	0.0	0	0.0	1	2.2
160,001-165,000	0	0.0	1	8.3	0	0.0	0	0.0	1	2.2
Unknown	3	17.6	0	0.0	0	0.0	0	0.0	3	6.5
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

Figure VI-5 Gross Combination Weight of LCVs
Fatal Involvements Only



Source: 1992 TIFA

Cargo body style and cargo

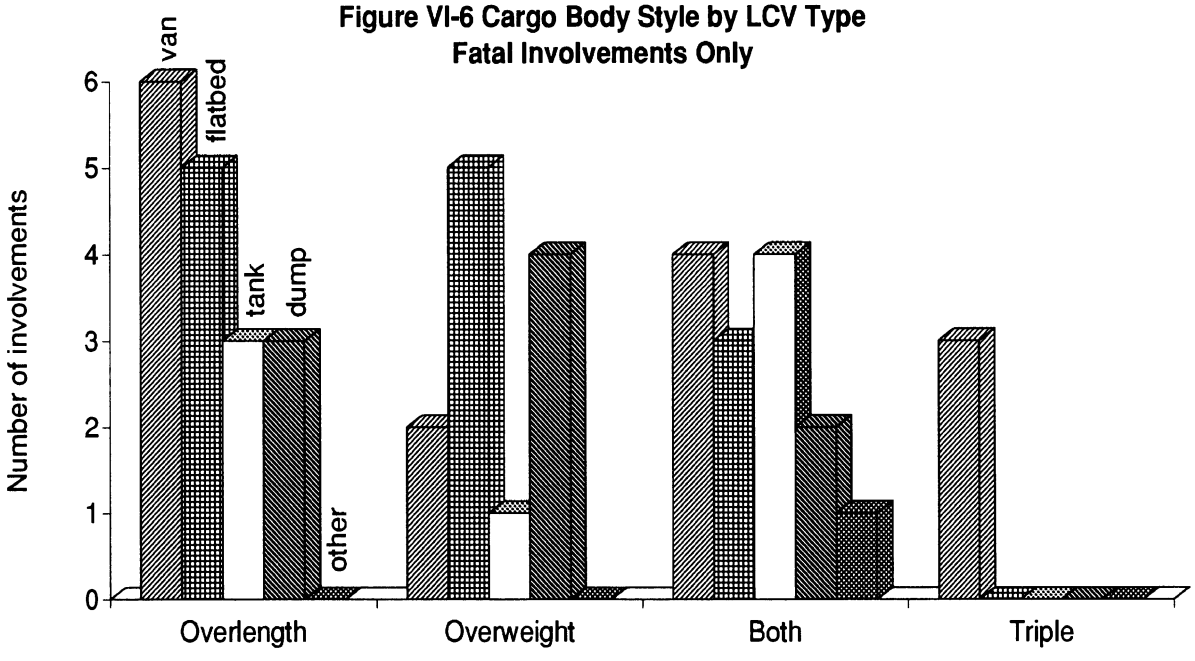
Table VI-7 shows the cargo body type of LCVs involved in fatal accidents. All the triples LCVs pulled van trailers. This reflects the common usage of triples in long-haul general freight carriage. Other than triples, the diversity of trailer cargo body types is striking. Ten of the 31 LCVs that met the length criterion ("overlength" and "both") had van trailers, but there were also eight flatbed, seven tank, and five dump trailer combinations. Similarly, though LCVs with GCWs over 80,000 pounds ("overweight" and "both") included six dump and eight flatbed combinations, there were also six van and five tank combinations. Without exposure data, it is impossible to know if these distributions reflect the diversity of LCVs or differential risk associated with particular cargo bodies.

Table VI-7 Cargo Body Style by LCV Type
Fatal Involvements Only

Cargo	Overlength		Overweight		Both		Triple		Total	
body	N	%	N	%	N	%	N	%	N	%
Van	6	35.3	2	16.7	4	28.6	3	100.0	15	32.6
Flatbed	5	29.4	5	41.7	3	21.4	0	0.0	13	28.3
Tank	3	17.6	1	8.3	4	28.6	0	0.0	8	17.4
Dump	3	17.6	4	33.3	2	14.3	0	0.0	9	19.6
Other	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

Figure VI-6 Cargo Body Style by LCV Type
Fatal Involvements Only



Source: 1992 TIFA

All three triples involved in fatal accidents in 1992 were vans loaded with general freight at the time of the accident (table VI-8). Other LCV types were also typically loaded at the time of the accident, and carried a variety of cargoes, as the diversity of cargo bodies indicated in table VI-7 would suggest. Of the 26 LCVs that met the weight criterion ("overweight" and "both"), six were loaded with general freight, five hauled solids in bulk (e.g., gravel, wood chips, coal), three carried metal objects (e.g., coils of steel or steel beams), four were loaded with farm products, and three with logs or lumber. LCVs that were overlength only were primarily either empty (8) or carried general freight (4). Three of the LCVs were loaded with hazardous cargo (fuel oil, propane, and gasoline, respectively) and none of the three experienced cargo spillage.

This table illustrates one aspect of including weight in the LCV definition. Combinations that qualify as "overweight" when fully loaded are not LCVs when empty. For weight-related LCVs, being an LCV is not an intrinsic quality of the vehicle itself, but an aspect of its use.

Table VI-8 Cargo Carried by LCV Type
Fatal Involvements Only

	Overlength		Overweight		Both		Triple		Total	
Cargo type	N	%	N	%	N	%	N	%	N	%
Empty	8	47.1	0	0.0	0	0.0	0	0.0	8	17.4
General freight	4	23.5	2	16.7	4	28.6	3	100.0	13	28.3
Metal	0	0.0	3	25.0	0	0.0	0	0.0	3	6.5
Gases in bulk	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Solids in bulk	1	5.9	4	33.3	1	7.1	0	0.0	6	13.0
Liquids in bulk	0	0.0	1	8.3	2	14.3	0	0.0	3	6.5
Logs/lumber	0	0.0	0	0.0	3	21.4	0	0.0	3	6.5
Farm products	3	17.6	2	16.7	2	14.3	0	0.0	7	15.2
Live animals	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Unknown	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

Road type

Most LCV fatal involvements occurred on roads with high-speed travel: limited access and rural, major arterials (table VI-9). Eighteen of the 46 LCV fatal involvements (39.1%) occurred on limited access roads, including all three triples involvements. Fifteen fatal LCV involvements (32.6%) occurred on rural major arteries. Taken together, these proportions are similar to those for all truck fatal involvements (table III-5), though since LCV involvements are few, a small number of cases can have a large effect on proportions.

Table VI-9 Road Class/Area Type by LCV Type
Fatal Involvements Only

Road class/ area type	Overlength		Overweight		Both		Triple		Total	
	N	%	N	%	N	%	N	%	N	%
Limited/Urban	5	29.4	2	16.7	3	21.4	1	33.3	11	23.9
Limited/Rural	1	5.9	2	16.7	2	14.3	2	66.7	7	15.2
Major/Urban	2	11.8	0	0.0	1	7.1	0	0.0	3	6.5
Major/Rural	7	41.2	3	25.0	5	35.7	0	0.0	15	32.6
Other/Urban	0	0.0	0	0.0	1	7.1	0	0.0	1	2.2
Other/Rural	2	11.8	2	16.7	1	7.1	0	0.0	5	10.9
Unknown	0	0.0	3	25.0	1	7.1	0	0.0	4	8.7
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

Company type

Twenty-nine of the 46 LCVs involved in fatal accidents in 1992 were operated by interstate ICC-authorized carriers (table VI-10). These for-hire carriers transport freight in interstate commerce. Together with the three LCVs operated by private interstate carriers, almost 70% of the LCVs involved in fatal accidents were interstate. Note that LCVs meeting only the weight criterion ("overweight") were somewhat more likely to be intrastate for-hire vehicles, that is, trucks operated only within a single State's boundaries. Several of these vehicles operated in Michigan, which permits very heavy combinations.

Table VI-10 Company Type by LCV Type
Fatal Involvements Only

Company type	Overlength		Overweight		Both		Triple		Total	
	N	%	N	%	N	%	N	%	N	%
Interstate:										
Private	2	11.8	0	0.0	1	7.1	0	0.0	3	6.5
For-hire	10	58.8	6	50.0	10	71.4	3	100.0	29	63.0
Intrastate:										
Private	2	11.8	1	8.3	2	14.3	0	0.0	5	10.9
For-hire	2	11.8	5	41.7	1	7.1	0	0.0	8	17.4
Unknown	1	5.9	0	0.0	0	0.0	0	0.0	1	2.2
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

First harmful event

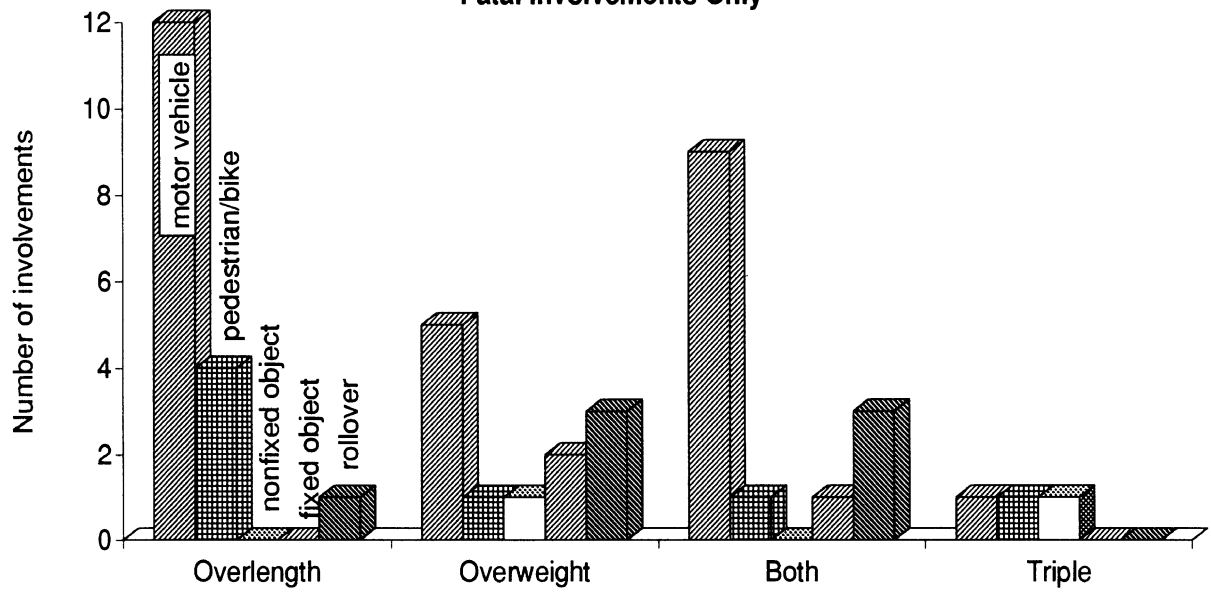
Table VI-11 shows the first harmful event in fatal accidents involving LCVs in 1992. The figure (figure VI-7) displays the same data in graphical form. As with all trucks (table III-7) a collision with a motor vehicle was the most frequent first harmful event. However, the proportion of cases where the first harmful event was a collision with a pedestrian or bicyclist (15.2%) is almost twice as high as for fatal involvements with all heavy truck types (8.6%, table III-7). Most of the LCVs involved in these cases were overlength ("overlength" and "both") or triples. Rollover as the first harmful event was also proportionately higher for LCVs than for all trucks, with most of the excess accounted for by the heavy LCVs ("overweight" and "both"). With so few cases, however, it is impossible to infer an association.

Table VI-11 First Harmful Event by LCV Type
Fatal Involvements Only

First harmful event	Overlength		Overweight		Both		Triple		Total	
	N	%	N	%	N	%	N	%	N	%
Collision:										
Motor vehicle	12	70.6	5	41.7	9	64.3	1	33.3	27	58.7
Pedestrian/bike	4	23.5	1	8.3	1	7.1	1	33.3	7	15.2
Non-fixed object	0	0.0	1	8.3	0	0.0	1	33.3	2	4.3
Fixed object	0	0.0	2	16.7	1	7.1	0	0.0	3	6.5
Non-collision:										
Rollover	1	5.9	3	25.0	3	21.4	0	0.0	7	15.2
Total	17	100.0	12	100.0	14	100.0	3	100.0	46	100.0

Source: 1992 TIFA

Figure VI-7 First Harmful Event by LCV Type
Fatal Involvements Only



Source: 1992 TIFA

VII. Bus Accidents

This section presents statistics on the involvement of buses in traffic accidents in 1992. All traffic accident statistics in the section are taken from the 1992 FARS file or the 1992 GES file. The GES file has a relatively small sample of bus cases, which limits the amount of detail that can be shown in the tables. The SAFETYNET accident system, when all States are fully reporting, will provide a census of all bus accidents and, consequently, a much improved description of them.

A **bus** is defined as a vehicle designed to carry at least sixteen people including the driver. Two types of buses are distinguished. A **school bus** is the familiar yellow-and-black vehicle commonly used to transport children to school. The **other bus** category includes transit (intracity) buses and cross-country (intercity) buses.

Note: All figures for involvements in fatal accidents and fatalities are taken from the FARS file. When the number is taken from FARS, it is shown exactly. Estimates based solely on GES or which combine information from FARS and GES are rounded to the nearest thousand.

Trends and overview of bus traffic accidents

In 1992, almost 650,000 buses were registered to operate on U.S. roads (table VII-1). Together, they accumulated over 5.7 billion miles, each bus travelling an average of 8,901 miles per year. Buses were involved in an estimated 15,000 traffic accidents, with a total of 15,000 buses involved. An estimated 6,000 of these were school buses, 8,000 were other buses, and bus type could not be determined for 1,000.

Table VII-1 Bus Statistics, 1992

	School Bus	Other Bus	Unknown	Total
Vehicles				
Registrations	**	**	**	644,732
Miles traveled (millions)	**	**	**	5,739
Average travel	**	**	**	8,901
Accidents				
Number	6,000	8,000	1,000	15,000
Number of buses involved	6,000	8,000	1,000	15,000
Bus involvements by accident severity				
Fatal	98	169	17	284
Injury	3,000	4,000	*	8,000
Towaway	3,000	3,000	*	7,000
Total	6,000	8,000	1,000	15,000

** Not available.
* GES estimate less than 500.
Sources: *Highway Statistics 1992*; 1992 FARS; 1992 GES

The number of buses involved in traffic accidents was stable at about 16,000 involvements per year from 1988 to 1992, with the exception of 1990 when an estimated 19,000 bus involvements occurred (table VII-2). The number of buses in fatal accidents has also fluctuated only within a narrow range, from a low of 276 in 1991 to a high of 311 in 1989. Counts of fatal involvements are taken from the FARS file, a census file of all fatal traffic accidents, so they are expected to be precise. Estimates of injury and towaway involvements are generated from the GES file. Since the GES file is based on a sample of accidents, each estimate has an associated sampling error. (See the Technical Appendix for more information on sampling errors in GES.) Tests of significance have been calculated for the differences between the annual totals. None of the year-to-year differences in the counts of injury or towaway involvements are statistically significant.

Table VII-2 Bus Involvements by Accident Severity 1988-1992

	Fatal		Injury		Towaway		Total	
Year	N	%	N	%	N	%	N	%
1988	286	1.7	9,000	57.5	7,000	40.7	16,000	100.0
1989	311	2.0	9,000	56.0	7,000	42.0	16,000	100.0
1990	288	1.5	9,000	49.1	9,000	49.3	19,000	100.0
1991	276	1.8	8,000	51.2	7,000	47.1	16,000	100.0
1992	284	1.9	8,000	50.9	7,000	47.2	15,000	100.0

Sources: 1992 FARS, 1992 GES

Table VII-3 shows the number of fatalities and injuries in bus-involved accidents, 1988-1992. The greatest number of deaths occurred in 1989, 366, though that year also had the smallest estimated number of injuries, 19,000. The largest number of injuries, 38,000, occurred the following year, then declined to 26,000 in 1991 and 25,000 in 1992. Although the differences between the estimated number of injuries in 1990 and each other year are statistically significant, they may be due to a change in the GES sampling procedures for trucks and buses in 1990. None of the other year-to-year differences are statistically significant, in part because GES includes only a relatively small sample of bus involvements.

Table VII-3 Total Fatalities and Injuries in Bus Accidents, 1988-1992

Year	Fatalities	Injuries	Total
1988	340	22,000	22,000
1989	366	19,000	20,000
1990	339	38,000	38,000
1991	306	26,000	26,000
1992	315	25,000	25,000
Annual average	333	26,000	26,000

Sources: 1992 FARS, 1992 GES

Bus type and accident severity

Table VII-4 shows bus involvements by bus type and accident severity in 1992. An estimated 6,000 of the 15,000 buses involved in traffic accidents were school buses. Though school buses accounted for 41.3% of all bus involvements, they were only 34.5% of bus involvements in fatal accidents and 37.8% of bus involvements in injury accidents. School buses may have had a lower proportion of fatal and injury involvements because school buses commonly operate in residential areas where traffic speeds are low.

Table VII-4 Bus Involvements by Bus Type and Accident Severity

	Fatal		Injury		Towaway		Total	
Bus type	N	%	N	%	N	%	N	%
School	98	34.5	3,000	37.8	3,000	45.3	6,000	41.3
Other bus	169	59.5	4,000	55.9	3,000	49.1	8,000	52.8
Unknown	17	6.0	*	6.3	*	5.6	1,000	5.9
Total	284	100.0	8,000	100.0	7,000	100.0	15,000	100.0

* GES estimate less than 500

Sources: 1992 FARS, 1992 GES

A total of 315 persons died in accidents involving buses in 1992 (table VII-5). One-third (105) of the fatalities occurred in accidents in which a school bus was involved, and almost 60% (187) occurred in accidents involving another type of bus. These fatalities include all deaths as a consequence of the accident, whether the fatality was in a bus or not. An estimated 25,000 persons were injured in traffic accidents involving buses, including 14,000 (55.5%) in school bus accidents and 10,000 (37.9%) in other bus accidents.

Table VII-5 Total Fatalities and Injuries by Bus Type

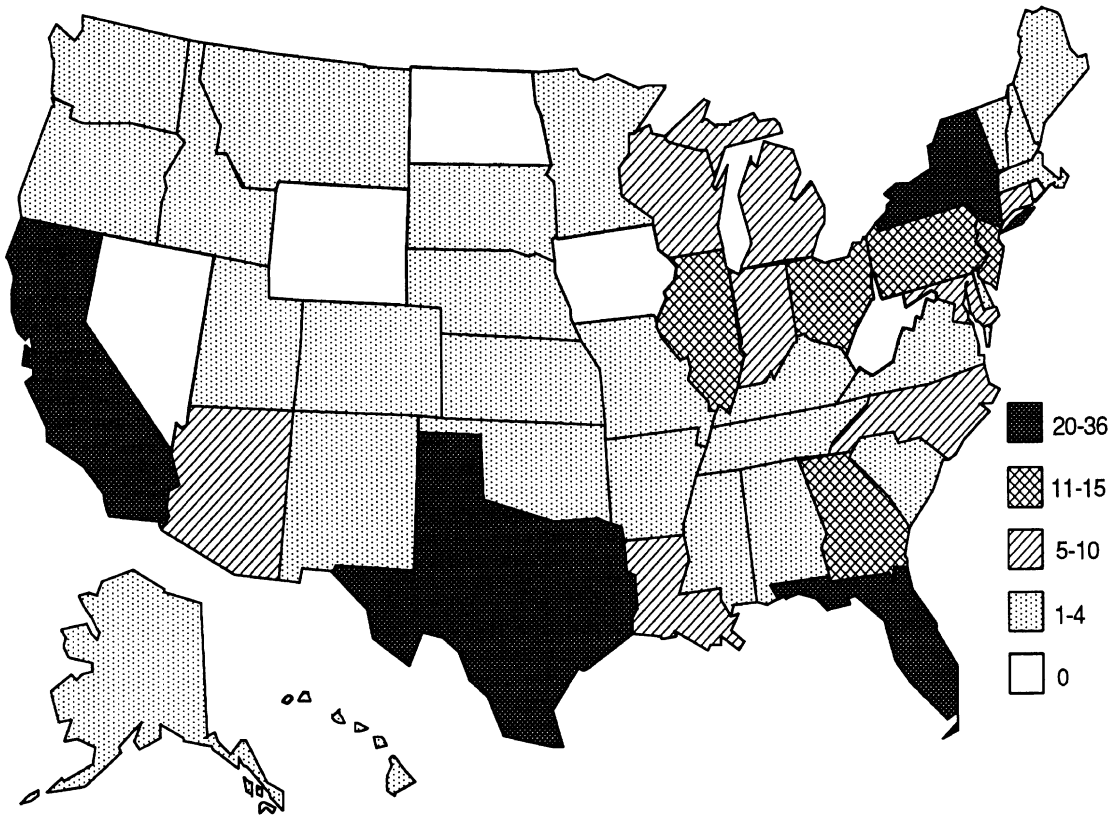
	Fatalities		Injuries		Total	
Bus type	N	%	N	%	N	%
School	105	33.3	14,000	55.5	14,000	55.2
Other bus	187	59.4	10,000	37.9	10,000	38.2
Unknown	23	7.3	2,000	6.6	2,000	6.6
Total	315	100.0	25,000	100.0	25,000	100.0

Sources: 1992 FARS, 1992 GES

Fatal bus involvements by State

Figure VII-1 shows the distribution of bus involvements across the U.S. in 1992. Only fatal bus involvements are shown, because only the FARS file identifies the State where the accident took place. (The State location of accidents of all severities will be available once the SAFETYNET accident system is fully implemented.) California, New York, Texas, and Florida had the greatest number of bus involvements; they are also the four most populous States. Iowa, Nevada, North Dakota, Rhode Island, West Virginia, and Wyoming all had no fatal bus involvements in 1992. Table VII-6 shows the number of fatal involvements of school buses, other buses, and unknown bus types separately for each State.

Figure VII-1 Fatal Bus Involvements, 1992



Source: 1992 FARS

Table VII-6 Fatal Bus Involvements by State and Bus Type, 1992

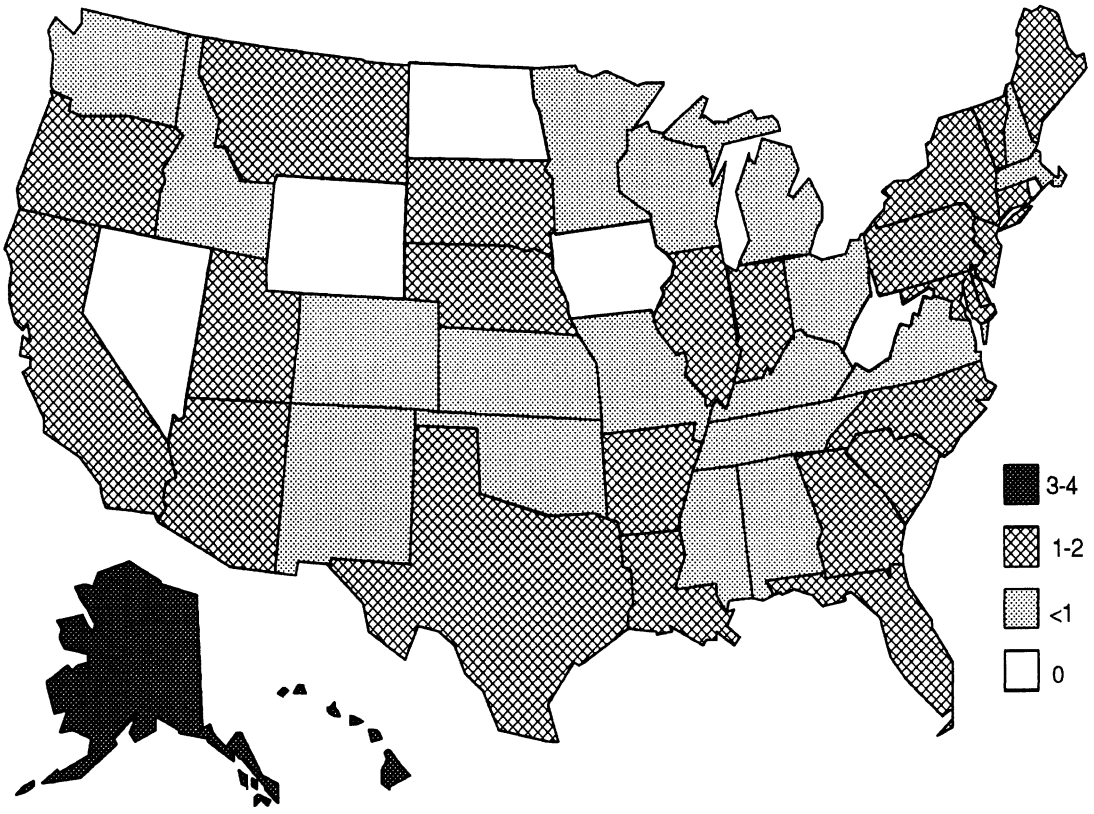
State	School		Other bus		Unknown		Total	
	N	%	N	%	N	%	N	%
Alabama	1	1.0	1	0.6	0	0.0	2	0.7
Alaska	2	2.0	0	0.0	0	0.0	2	0.7
Arizona	2	2.0	3	1.8	1	5.9	6	2.1
Arkansas	1	1.0	2	1.2	0	0.0	3	1.1
California	3	3.1	33	19.5	0	0.0	36	12.7
Colorado	0	0.0	3	1.8	0	0.0	3	1.1
Connecticut	3	3.1	2	1.2	0	0.0	5	1.8
Delaware	1	1.0	0	0.0	0	0.0	1	0.4
D.C.	0	0.0	3	1.8	0	0.0	3	1.1
Florida	7	7.1	12	7.1	1	5.9	20	7.0
Georgia	5	5.1	6	3.6	1	5.9	12	4.2
Hawaii	0	0.0	4	2.4	0	0.0	4	1.4
Idaho	0	0.0	1	0.6	0	0.0	1	0.4
Illinois	8	8.2	7	4.1	0	0.0	15	5.3
Indiana	4	4.1	2	1.2	0	0.0	6	2.1
Iowa	0	0.0	0	0.0	0	0.0	0	0.0
Kansas	1	1.0	0	0.0	0	0.0	1	0.4
Kentucky	2	2.0	1	0.6	0	0.0	3	1.1
Louisiana	4	4.1	4	2.4	0	0.0	8	2.8
Maine	1	1.0	1	0.6	0	0.0	2	0.7
Maryland	4	4.1	4	2.4	0	0.0	8	2.8
Massachusetts	0	0.0	1	0.6	0	0.0	1	0.4
Michigan	3	3.1	6	3.6	0	0.0	9	3.2
Minnesota	1	1.0	1	0.6	1	5.9	3	1.1
Mississippi	1	1.0	1	0.6	0	0.0	2	0.7
Missouri	0	0.0	4	2.4	0	0.0	4	1.4
Montana	0	0.0	0	0.0	1	5.9	1	0.4
Nebraska	1	1.0	0	0.0	1	5.9	2	0.7
Nevada	0	0.0	0	0.0	0	0.0	0	0.0
New Hampshire	0	0.0	1	0.6	0	0.0	1	0.4
New Jersey	2	2.0	6	3.6	4	23.5	12	4.2
New Mexico	1	1.0	0	0.0	0	0.0	1	0.4
New York	5	5.1	16	9.5	2	11.8	23	8.1
N.Carolina	4	4.1	3	1.8	0	0.0	7	2.5
N.Dakota	0	0.0	0	0.0	0	0.0	0	0.0
Ohio	5	5.1	3	1.8	3	17.6	11	3.9
Oklahoma	1	1.0	0	0.0	0	0.0	1	0.4
Oregon	0	0.0	3	1.8	0	0.0	3	1.1
Pennsylvania	5	5.1	8	4.7	0	0.0	13	4.6
Rhode Island	0	0.0	0	0.0	0	0.0	0	0.0
S.Carolina	2	2.0	1	0.6	1	5.9	4	1.4
S.Dakota	0	0.0	1	0.6	0	0.0	1	0.4
Tennessee	1	1.0	3	1.8	0	0.0	4	1.4
Texas	10	10.2	13	7.7	0	0.0	23	8.1
Utah	1	1.0	2	1.2	0	0.0	3	1.1
Vermont	0	0.0	1	0.6	0	0.0	1	0.4
Virginia	1	1.0	2	1.2	1	5.9	4	1.4
Washington	0	0.0	4	2.4	0	0.0	4	1.4
W.Virginia	0	0.0	0	0.0	0	0.0	0	0.0
Wisconsin	5	5.1	0	0.0	0	0.0	5	1.8
Wyoming	0	0.0	0	0.0	0	0.0	0	0.0
Total	98	100.0	169	100.0	17	100.0	284	100.0

Source: 1992 FARS

Fatal bus involvements per capita

Though figure VII-1 shows that fatal bus involvements seem to be concentrated in certain States, figure VII-2 suggests that the number of fatal bus involvements in a State is strongly associated with population size. The figure shows fatal bus involvements per million population in each of the fifty States. The range of the fatal involvement rate is relatively narrow, from zero in States with no fatal involvements to under four involvements per million for Alaska and Hawaii. The narrow range suggests that State-to-State differences are not large, particularly since the rates themselves are relatively low. Since there are so few fatal bus involvements, a change of one or two involvements in a small State can make a large difference in the involvement rate per capita for that State.

Figure VII-2 Fatal Bus Involvements per Million Population, 1992

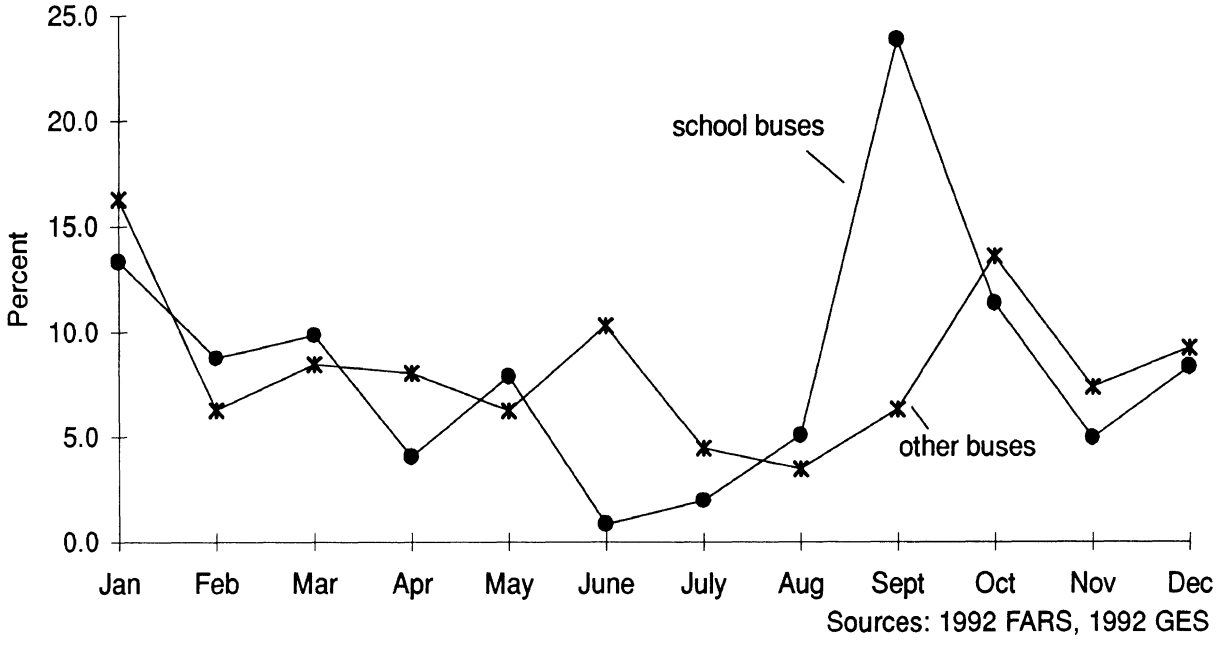


Source: 1992 FARS,
Statistical Abstract, 1992

Bus involvements by month, day of week, and time of day

Bus accident involvements show interesting variations by month (figure VII-3). School bus involvements were lowest during the summer months and then peaked in September, the traditional back-to-school month, with 23.8% of all school bus involvements. School bus involvements declined precipitously in November, with only 4.9% of the involvements, before peaking again in January at 13.3%. Involvements of other buses also showed seasonal variation, though not of the same magnitude as school buses. The reasons for these patterns are not clear, though they may reflect small sample sizes in the GES file. The GES file includes only a limited number of bus cases. The SAFETYNET accident system, which will include all bus involvements, should clarify the picture.

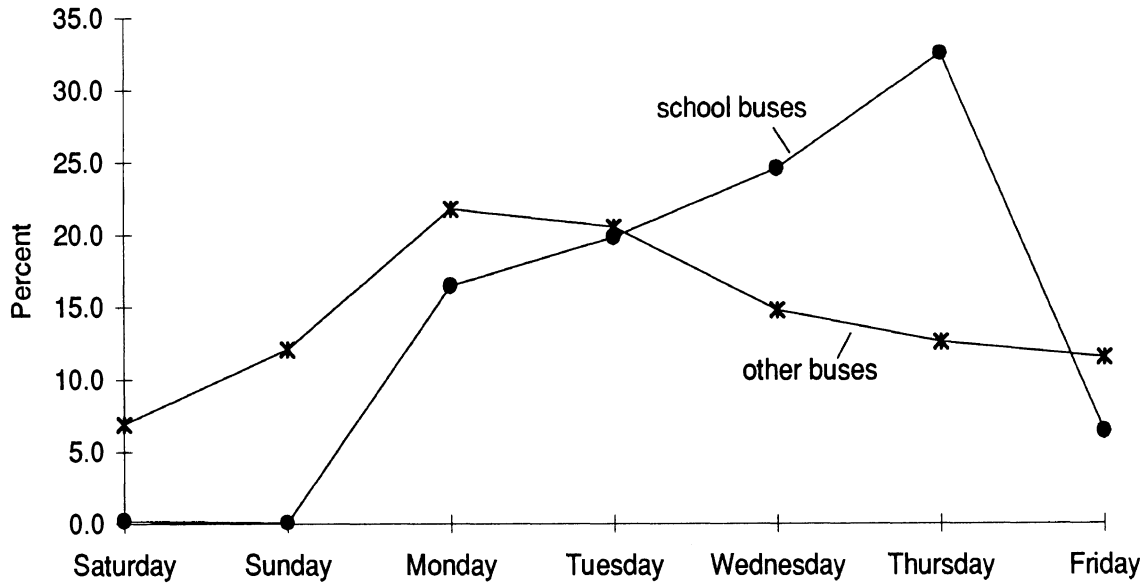
Figure VII-3 Bus Involvements by Month



Sources: 1992 FARS, 1992 GES

School bus accident involvements in 1992 occurred primarily during the week (figure VII-4). Only a handful occurred over the weekend. (The low proportion of schoolbus involvements on Fridays is unexpected and may be due to the small sample of bus involvements in GES.) Involvements of other buses were more uniformly distributed over the week, though they too showed a definite pattern. Other buses include both intracity transit buses and intercity cross-country buses. Involvements were low over the weekend and rose to a peak on Mondays and Tuesdays when over 40% of all other bus accident involvements occurred. Proportions of other bus involvements were lower for the remainder of the work week.

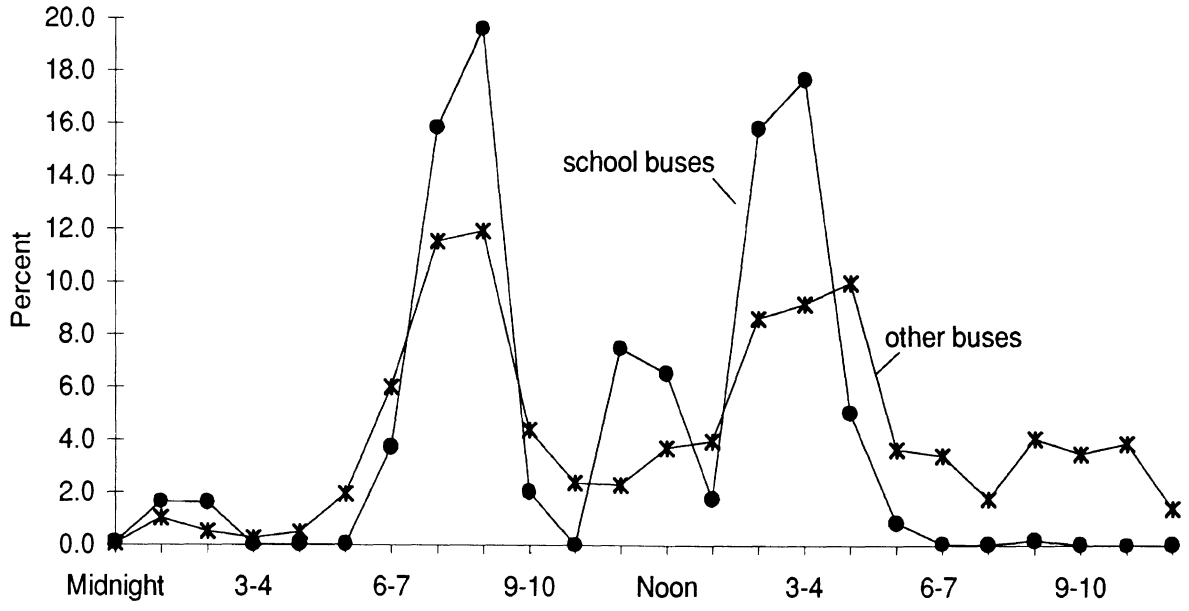
Figure VII-4 Bus Involvements by Day of Week



Sources: 1992 FARS, 1992 GES

Figure VII-5 shows the distribution of school bus and other bus involvements in 1992 by time of day in one-hour increments. Hourly differences are not based on sample sizes large enough to be statistically significant, yet the patterns of involvement over the course of the day clearly followed the typical usage of both school and other buses. School bus involvements had two major peaks, from 7 AM to 9 AM and from 2 PM to 4 PM, corresponding to the periods of travel to and from school. Other buses show similar peaks, encompassing morning and afternoon rush hours in most cities, when there are more transit buses in use. School buses had few involvements after 6 PM and before 6 AM. Other buses, which include city transit buses as well as passenger buses between cities, had significant numbers of involvements until about midnight.

Figure VII-5 Bus Involvements by Time of Day



Sources: 1992 FARS, 1992 GES

Manner of collision

School buses had a lower proportion of single-vehicle involvements and angle collisions than other buses, while they had a higher proportion of rearend collisions (table VII-7). These differences are not statistically significant due to small sample sizes, though they may be real nevertheless. Overall, the distribution of manner of collision for buses is similar to the distribution for trucks (table III-6), though buses had a lower proportion of single-vehicle involvements, while trucks had a lower proportion of angle collisions.

Table VII-7 Bus Accident Involvements by Manner of Collision

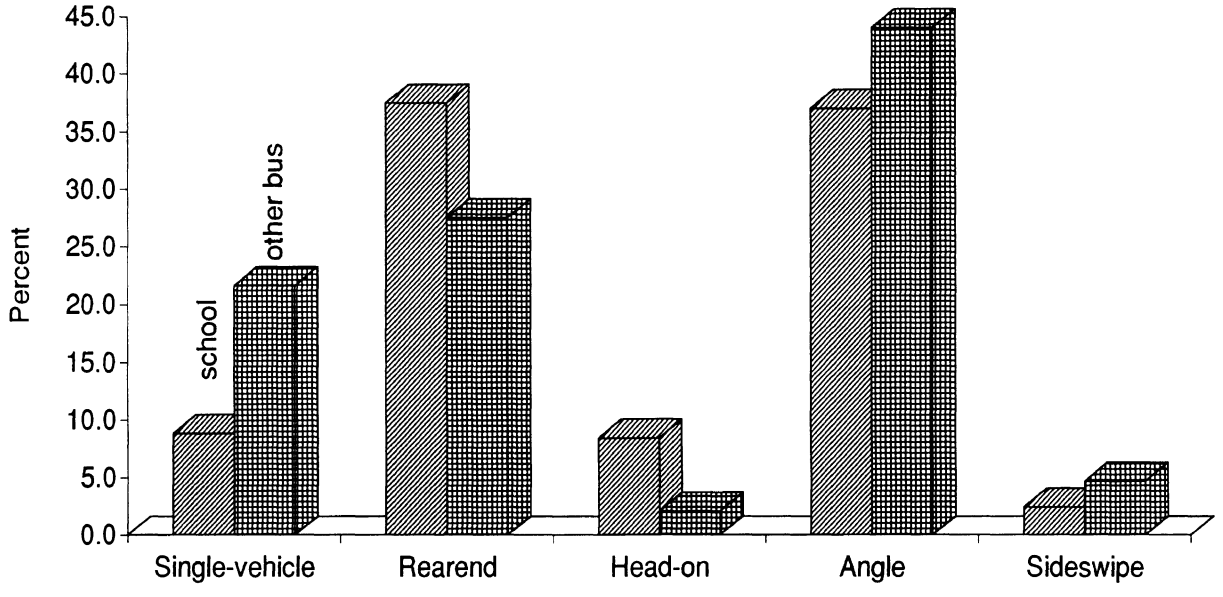
Collision	School bus		Other bus		All	
Type	N	%	N	%	N	%
Single-vehicle	1,000	8.8	2,000	21.6	2,000	15.9
Rearend	2,000	37.4	2,000	27.5	5,000	31.1
Head-on	1,000	8.4	*	2.1	1,000	4.7
Angle	2,000	36.9	3,000	43.9	6,000	42.2
Sideswipe	*	2.4	*	4.7	1,000	3.5
Other	*	6.0	*	0.2	*	2.6
Total	6,000	100.0	8,000	100.0	15,000	100.0

* GES estimate less than 500

Note: Total includes an estimated 1,000 cases with unknown bus type.

Sources: 1992 FARS, 1992 GES

Figure VII-6 Manner of Collision by Bus Type



Sources: 1992 FARS, 1992 GES

Driver age and sex

School bus drivers involved in traffic accidents tended to be older than the drivers of other buses involved in accidents (table VII-8). About 44.8% of school bus drivers were between the ages of 45 and 64, while only 30.8% of the drivers of other buses involved in an accident fell in that age range. Most (60.7%) accident-involved other bus drivers were 25 to 44, compared with an estimated 46.6% of school bus drivers. School bus drivers in general may tend to be older than other bus drivers, though there are no exposure data available. However, bus drivers in traffic accidents were older than accident-involved truck drivers. About 3.2% of bus drivers were younger than 25, compared with an estimated 12.1% of accident-involved truck drivers. An estimated 5.8% of bus drivers involved in an accident were 65 or older, compared with 2.0% of truck drivers.

Table VII-8 Bus Accident Involvements by Driver Age

	Bus drivers							
	School bus		Other bus		Total		Truck drivers	
Driver age	N	%	N	%	N	%	N	%
<25	*	2.6	*	3.7	*	3.2	16,000	12.1
25-44	3,000	46.6	4,000	60.7	8,000	54.3	77,000	58.2
45-64	3,000	44.8	2,000	30.8	5,000	36.5	37,000	27.7
>64	*	6.0	*	4.5	1,000	5.8	3,000	2.0
Total	6,000	100.0	7,000	100.0	14,000	100.0	133,000	100.0

Note: Total for bus drivers includes an estimated 1,000 cases with unknown bus type.
Sources: 1992 GES, 1992 TIFA, 1992 FARS

School bus drivers were split almost evenly by sex, with 49.8% males and 50.2% females (table VII-9). Among the drivers of other buses involved in a traffic accident, males accounted for a significantly higher proportion with 78.1%. These proportions are in marked contrast with accident-involved truck drivers, of whom an estimated 96.7% were male in 1992.

Table VII-9 Bus Accident Involvements by Driver Sex

	Bus drivers							
	School bus		Other bus		Total		Truck drivers	
Driver sex	N	%	N	%	N	%	N	%
Male	3,000	49.8	6,000	78.1	9,000	65.2	128,000	96.7
Female	3,000	50.2	2,000	21.5	5,000	34.7	4,000	3.3
Total	6,000	100.0	7,000	100.0	14,000	100.0	133,000	100.0

* GES estimate less than 500
Note: Total for bus drivers includes an estimated 1,000 cases with unknown bus type.
Sources: 1992 GES, 1992 TIFA, 1992 FARS

Glossary

Accident severity: A measure of traffic accident consequences in terms of the most severe injury produced by the event. See *injury severity.*

Accident: See *traffic accident*

Authorized carrier: A for-hire carrier that operates across state lines and has authorization from the Interstate Commerce Commission. See *exempt carrier.*

Bobtail: A tractor operating without a trailer.

Bus: A passenger-carrying vehicle designed to seat at least sixteen people, including the driver.

Double: A combination vehicle consisting of a tractor pulling two trailers.

Ejection: Ejection occurs when a person is completely or partially thrown from the vehicle during the accident.

Exempt carrier: A for-hire carrier exempt from some Interstate Commerce Commission regulations because of the type of commodities carried. Most exempt commodities are those whose delivery is time-critical, such as air freight and perishable farm products. See *authorized carrier.*

Fatal Accident Reporting System (FARS): See the Introduction.

Fatal accident: An accident in which the most serious event is one or more people killed as a consequence of the accident. This includes any person involved in the accident, including pedestrians and bicyclists, as well as occupants of passenger cars, trucks, and buses.

Fatal involvement: The involvement of a vehicle in a fatal accident. The fatality does not necessarily occur in the vehicle.

For-hire carrier: A company that transports goods for hire. Examples include moving companies, parcel services, and truck-load carriers. For-hire carriers, if operating in interstate commerce, are either *authorized* or *exempt.*

General Estimates System (GES): See the Introduction.

Injury accident: An accident in which the most serious event is one or more persons transported for medical attention to injuries incurred in the

accident. This includes any person involved in the accident, including pedestrians and bicyclists, as well as occupants of passenger cars, trucks, and buses. If there is a fatality in the accident, it is classified as a fatal accident, regardless of whether anyone was transported for medical attention.

Injury involvement: The involvement of a vehicle in an injury accident. The injury does not have to occur in the vehicle.

Injury severity: Injuries are classified as either A, B, or C:

> A injury An incapacitating injury, other than fatal, that prevents a person from walking, driving, or normally performing the activities the person was capable of before the injury.
>
> B injury A non-incapacitating injury which is visible or evident to observers at the scene of the accident.
>
> C injury A possible injury which is reported or claimed, but which is neither incapacitating nor evident to observers at the scene of the accident.

Interstate carrier: A private, authorized, or exempt carrier that transports goods across State lines.

Intrastate carrier: A private or for-hire carrier that operates entirely within one State. An intrastate carrier does not transport goods across State lines.

Jackknife: Jackknife occurs in a multi-unit combination when the trailers rotate on their vertical axes with respect to the tractor in an uncontrolled fashion, often resulting in contact between the units and damage. In the case of a tractor-semitrailer, the combination folds up like a pocket knife.

Limited access road: A road to which access is limited to certain points only, as in the case of Interstate highways.

Major arterial: A U.S. or State numbered route which is not a *limited access* highway.

Multi-trailer: A truck, either tractor or straight truck, operating with two or more trailers. A multi-trailer combination is most often a tractor pulling two trailers.

One-trailer: A truck, either tractor or straight truck, operating with one trailer. A one-trailer combination is most often a tractor pulling one semitrailer.

Other road: Any road which is not a *limited access* road or a *major arterial.*

Private carrier: A private carrier uses its trucks to carry its own goods. Farms, construction companies, and grocery distributors are all examples of private carriers.

Rollover: Rollover occurs when the vehicle overturns. Rollover includes any number of quarter turns. A truck that turned onto its side would count as a rollover.

Rural: A rural area is any area not in an urban area.

Semitrailer: A trailer pulled by a tractor, with one or more axles located toward the rear of the trailer. The trailer is connected to the tractor by means of a king-pin/fifth wheel connection.

Single-unit: A truck with no trailer. These are primarily "straight trucks," but also include some tractors operating without a trailer. See *straight truck* and *bobtail.*

Single: A combination vehicle consisting of a tractor pulling a semitrailer.

Straight truck: A power unit that includes a permanently mounted cargo body (e.g., a dump truck).

Towaway accident: An accident in which the most serious event is one or more involved vehicles towed from the scene due to disabling damage from the accident. Disabling damage is damage that renders the vehicle unsafe to drive under the conditions. An accident that involves either a fatality or an injury transported for treatment is classified as a fatal or injury accident, respectively.

Towaway involvement: The involvement of a vehicle in a towaway accident, whether the vehicle itself is towed or not.

Tractor: A heavy truck, with little or no cargo-carrying capacity, designed to pull semitrailers and full trailers.

Traffic accident: An unintended traffic event involving motor vehicles in transport on public roads that includes at least one harmful event. In this document, all traffic accidents conform to the SAFETYNET harm threshold, with at least one of the following:

- one or more persons killed as a result of the accident
- one or more persons transported from the scene for immediate medical attention
- one or more vehicles towed from the accident as a result of disabling damage sustained in the accident

Triple: A combination vehicle consisting of a tractor pulling three trailers, most often a semitrailer and two full trailers.

Truck configuration: A classification of the combination of power unit type and number of trailers. See *single, double,* and *straight truck.*

Truck: A cargo-carrying vehicle with at least two axles and six tires. Includes tractors as well as straight trucks. Excludes buses, motorhomes, and farm and construction equipment not designed to carry cargo on public roads.

Trucks Involved in Fatal Accidents (TIFA): See the Introduction.

Urban: An urban area is an area with a population of 5,000 or more whose boundaries are fixed by State and local authorities and approved by the Federal Highway Administration. The boundaries do not necessarily correspond to political boundaries.

Technical Appendix

GES sample design

The police accident reports (PARs) from which the GES data are coded are a probability sample of police-reported accidents that occurred in the United States. Since each accident had a chance of being selected, the design makes it possible to compute not only national estimates but also probable errors associated with the estimates.

The selection of the sample of PARs for the GES sample was accomplished in three stages. The first stage is a sample of geographic areas, called Primary Sampling Units (PSUs), from across the United States. A PSU is either a central city, a county surrounding a central city, an entire county, or group of contiguous counties. The U.S. was divided into 1,195 of these PSUs. The PSUs were then grouped into 12 categories according to the following geographic regions and types of PSUs:

- Geographic region—Northeast, South, Central, and West
- Type—Large Central City, Large Suburban Area, All others

The second stage of selection is a sample of police jurisdictions within the geographic areas. In most areas, the number of police jurisdictions is more than can be reasonably visited by a data collector. All jurisdictions within a PSU were enumerated and the number of accidents investigated by each was determined. A probability sample of jurisdictions within each PSU was selected with probability proportional to the number of accidents investigated, i.e., as the number of accidents investigated increased, the probability of selecting that jurisdiction increased. An average of six or seven police jurisdictions are selected within each area.

The third and final stage of the sample is the selection of PARs within the sample police jurisdictions. The GES data collectors make weekly, biweekly, or monthly visits to each of the jurisdictions in the sample. During the visit, the data collectors list all PARs not previously listed. The PARs are grouped, or stratified, into four groups:

- Group 1. All accidents involving a towed passenger vehicle (i.e., a passenger car, light truck, or van, but no medium or heavy trucks)
- Group 2. All accidents involving a medium or heavy truck and where at least one passenger vehicle was towed or an involved person was injured

- Group 3. All accidents not involving a towed passenger vehicle or medium or heavy truck, but in which an involved person was injured

- Group 4. All other accidents

Within each of these groups a systematic sample of accidents is selected, based on different sampling ratios. In some very large police jurisdictions the number of police-investigated accidents is too large for reasonable listing. In these jurisdictions the data collector will list a subsample of PARs, with those listed depending on the Police Accident Report Number.

The data collector obtains copies of the selected PARs and sends them to a central contractor, who extracts the required data, codes it into a common format and enters the data into an electronic file. In 1992 46,197 PARs were sampled.

GES estimates

In order to calculate estimates of national characteristics, data from each selected sample PAR must be weighted to reflect its probability of selection. Because there are three stages in the GES sampling process, the sample weight is the product of the inverse of the probability of selection at each of these stages. These sample weights are appended to the record for that sample PAR in the electronic data file. By summing the sampling weights for each PAR on the electronic data file that have a certain characteristic, an estimate of the National total for the characteristic can be produced.

Estimates of accuracy

The national estimates produced from GES data may differ from the true values, because they are based on a probability sample of accidents and not a census of all accidents. The size of these differences may vary depending on which sample of accidents was selected. The standard error of an estimate is a measure of the precision or reliability with which an estimate from this particular GES sample approximates the results of a census.

It is impractical to compute and provide a standard error for each estimate in the *Factbook*. Instead, generalized standard errors for estimates of totals are provided in the following table. Generalized standard errors are shown for accident characteristics, vehicle characteristics, and people characteristics. The generalized errors were produced separately for the accident, vehicle, and people estimates using three steps:

1. The standard errors for selected estimates in the report were calculated using a Taylor series approximation.

2. An equation that best fit these standard errors was found using regression techniques.

3. Approximate standard errors were generated from this equation and the generalized errors shown in the table were produced.

The table lists several representative estimated population values and an estimate of one standard error for that value derived from 1992

GES data. By adding and subtracting one standard error to the associated estimate, approximate 68% confidence intervals for an estimate can be created. For example, the estimated number of trucks involved in traffic accidents in 1992 is given in Table II-2 as 139,000. To calculate one standard error for this accident estimate, use the column headed "vehicles" in the table. Since 139,000 does not appear in column, use linear interpolation from the standard error values for 120,000 and 140,000. One approximate standard error would be 11,200 – 70 = 11,130. The 68% confidence interval for this estimate would be 139,000 ± 11,130 or 127,870 to 150,130. Twice the standard error gives approximately the 95% confidence interval. For the number of trucks involved in traffic accidents in 1992, the 95% confidence interval would be 116,740 to 161,260.

More information on standard error estimates can be obtained from the National Center for Statistics and Analysis in the National Traffic Highway Safety Administration.

Standard errors for estimates of accidents, vehicles, and people from 1992 GES file

	Standard errors		
Estimate	accidents	vehicles	people
1,000	400	400	400
2,000	600	600	500
3,000	800	700	600
4,000	900	900	800
5,000	1,100	1,000	900
10,000	1,700	1,500	1,400
15,000	2,200	2,000	1,800
20,000	2,700	2,500	2,200
25,000	3,100	2,900	2,600
30,000	3,600	3,300	3,000
35,000	4,000	3,700	3,400
40,000	4,400	4,100	3,700
45,000	4,800	4,500	4,100
50,000	5,200	4,800	4,400
60,000	6,000	5,600	5,100
70,000	6,800	6,300	5,800
80,000	7,600	7,000	6,500
90,000	8,300	7,700	7,200
100,000	9,100	8,400	7,800
120,000	10,500	9,800	9,100
140,000	12,000	11,200	10,400
160,000	13,400	12,500	11,700
180,000	14,800	13,900	13,000